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ABSTRACT

Compiled to introduce the dental assisting student to various techniques used in the dental office and to present theoretical information essential for the student's professional development, this laboratory guide consists of three units of instruction. The first unit is an introduction to dental assisting and contains five topics of study. The second unit covers nine anatomy and physiology topics, and the third unit consists of seventeen topics dealing with laboratory procedures. Each unit includes an introduction, objectives, equipment needed, and a written laboratory exercise which may be assigned for the student's own personal use, for classroom discussion, or as homework. Many of the units contain final criteria sheets for instructor evaluation. References listed at the end of the guide are suggested for use as reading assignments, reference materials, or supplementary material on topics of interest not covered within the guide. (BM)

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State of New Jersey
Department of Education
Division of Vocational Education

DENTAL ASSISTING LABORATORY MANUAL

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October 1977

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To the Instructor

This laboratory guide has been compiled to introduce the dental assisting student to various techniques used in the dental office. It also contains theoretical information that is essential for the student to become a capable, responsible dental assistant.

Each unit includes an introduction, objectives, equipment needed, and a written laboratory exercise. Many of the units contain final criteria sheets for instructor evaluation. It is suggested that the student submit the criteria sheet with the completed project for this evaluation. The exercises may be assigned for the student's own personal use, for classroom discussion, or as homework assignments.

It is also suggested that each laboratory session be introduced by the instructor and include a demonstration; however, most units are well defined and illustrated so that the student may use it as a programed, self-paced, individual study.

References listed at the end of this guide may be used for reading assignments, as reference materials, or as supplementary material on topics of interest not covered within this guide.

Procedures need not be done in order as presented and may be sequenced to suit the individual needs of a specific program. This guide has been designed for use in either secondary or post-secondary dental-assisting programs.

To the Student

This laboratory manual has been compiled to introduce you to various dental-assisting procedures and techniques you may find in a dental-office situation.

Safety rules in the initial unit of this manual must be followed *at all times* when working in the dental laboratory.

For success on the job it is necessary that you become familiar with many, many procedures; some are uncomplicated and others complex. Repeated practice in performing these procedures will make you a better, more competent dental assistant. To assist you in attaining this goal, this manual was written.

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Safety regulations must be observed at all times in the dental-assisting laboratory suite. The care with which you maintain your dental equipment as well as the care with which you perform the exercises will greatly affect your success in laboratory procedures.

Observing the following rules will help to maintain a neat, clean, and safe working environment.

Student work bench

1. Protect the table surface by using a work tile or other protective covering (Avoid using a paper towel or other flammable item if using a bunsen burner.)
2. Keep the area free of all unnecessary books, pocketbooks, coats, and personal belongings.
3. The benches should be cleaned thoroughly after each laboratory session with soap and water. If necessary, scrub the top with a stiff brush.
4. Any electrical appliances used at the bench should be unplugged at the end of the laboratory session.
5. Bunsen burners should be placed neatly on the bench, but do not disconnect tubing.
6. Stools should be placed neatly under the workbench at the end of the laboratory session.

Other work areas

1. All power equipment must be turned off after each use.
2. It is mandatory that all students wear safety glasses when working with power equipment (e.g. model trimmers, lathes, handpieces, etc.)
3. The demonstration bench is not to be used by students. This area should be kept clean at all times.
4. Floors should be free from all debris. Spilled liquids and/or powders should be wiped up immediately.

Personal appearance

1. All students must wear laboratory coats during laboratory sessions.
2. Hair must be worn short or tied back to keep it from getting caught in running equipment or possibly burned.

Other precautions

1. No equipment or materials will be used without prior directions and demonstration.
2. Each student is responsible for all equipment assigned to her/him. Any breakage must be reported to the instructor immediately.
3. Any injuries, no matter how slight, must be reported to the instructor immediately.
4. No smoking or eating is permitted in the dental laboratory area.

Objectives:

1. Given a specific dental material, correctly weigh it on either a scale or balance and record the weighing, correct to 0.01 of a gram.
2. Given a liquid, measure it in a graduate and record accurately to 0.01 ml.
3. Given any percentage, convert it to a ratio, decimal fraction, and common fraction.
4. Given any ratio, convert it to a percentage, decimal fraction, and common fraction, and express it in its lowest terms.
5. Complete a chart, correctly converting percentages, common fractions, decimal fractions, and ratios to their equivalents.
6. Given a percentage solution, correctly prepare this solution, using proper mixing techniques.
7. Given a ratio, correctly prepare this mixture, displaying proper technique.
8. Given a mercury thermometer, correctly read and record both Fahrenheit and Celsius readings.
9. Convert Fahrenheit to Celsius thermometer readings and vice versa.

Equipment:

Boley gage
Warm-water bath
Mercury thermometer
Graduates
Balance and/or scale
Specified materials to be weighed
Household measures – cup, tablespoon, teaspoon, paper cup,
Alginate scoop
Laboratory jar
Room-temperature water

Laboratory Exercise – Percentages, Ratios, and Temperatures

Name ____________________ Date ________

Dry measure

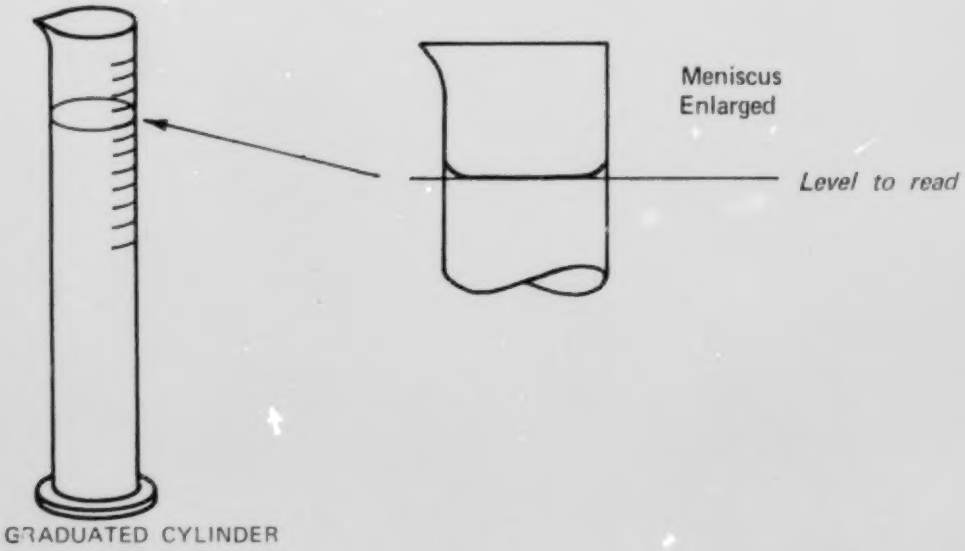
Measure and weigh the following and record your findings on the chart below:

Material	Weight (Grams)
2 scoops alginate	
1/4 cup plaster	
1/2 cup dental stone	
1/2 cup table salt	
1/4 cup pumice	

Liquid measure

Using water, compare the capacity of the following containers, as measured in a graduate. Record in millimeters below.

Note: When reading liquids in calibrated containers, hold the container at eye level and read the lowest level of the curve of the liquid. This curve is called a *meniscus.*



1 laboratory jar (completely filled) = ______ ml.

1 paper cup (completely filled) = ______ ml.

¼ household measuring cup = ______ ml.

1 tablespoon = ______ ml.

2 teaspoons = ______ ml.

In measuring solutions for cold disinfection and/or medications, would it be safe to use household measures instead of the metric measurements? ______

Why? ____

____

____

Percentages

The term "percent" and its corresponding symbol, %, means hundredths. A percent is really a fraction whose numerator is expressed and whose denominator is *understood* to be 100. The quantity expressed tells how many parts out of each 100 parts are being considered.

Examples:

a. 50% means 50 parts out of each 100 parts are being considered.

b. 5% means 5 parts of each 100 parts are being considered.

c. ½% means *½ of 1 part* of each 100 parts is being considered.

We see, then, how hundredths can be expressed by percents. Hundredths can also be expressed by fractions, decimal fractions, and ratios. Therefore, a percent can be changed to a common fraction, to a decimal fraction, or to a ratio, and vice versa. The form is changed, but the value remains the same.

Example:

$$5\% = \overset{\textit{common fraction}}{\frac{5}{100}} = \overset{\textit{decimal fraction}}{0.05} = \overset{\textit{ratio}}{5:100}$$

All of the above terms have the same value.

Ratios

An expression like 1:4 is called a ratio.

A ratio is another way to indicate the relationship of one quantity to another. The quantities must be in the *same unit of measure*.

In changing a fraction to a ratio, the numerator becomes the first term (in front of the colon), and the denominator the second term (after the colon). When changing a ratio to a fraction, the first term in the ratio becomes the numerator, and the second term becomes the denominator.

Example:

3/9 expressed as a ratio is 3:9 and is read "3 to 9."

Both terms can be multiplied or divided by the same number without changing the value of the ratio.

Example:

3:9 divided by 3 is 1:3. therefore, 3:9 equals 1:3

Converting from one form to another:

From a common fraction . . .

To a decimal fraction: Carry out the division indicated by the fraction

Example: $\frac{5}{8} = \overset{.625}{8\overline{)5.000}} = .625$

To a percent. If fraction has a denominator that can be readily changed to hundredths, do so. Otherwise divide as above and move the decimal point two places to the right.

Examples: $\frac{3}{20} = \frac{15}{100} = 15\%$

$\frac{5}{8} = .625$ (from above) $= 62.5\%$

To a ratio. Express with a colon

Example: $\frac{5}{8} = 5:8$

From a decimal fraction . . .

To a common fraction. Use 10, 100, or 1000 as a denominator and reduce the fraction.

Example: $.005 = \frac{5}{1000} = \frac{1}{200}$

To a ratio. Convert to a common fraction first, reduce if possible, and change to ratio form.

Example: $.08 = \frac{8}{100} = \frac{2}{25} = 2:25$

To a percent. Move the decimal point two places to the right.

Example: $.005 = .5\%$ (five-*tenths* percent)

From a percent . . .

To a decimal fraction. Move the decimal point two places to the left.

Example: $1.8\% = .018$

To a common fraction. Put percent over 100 as a denominator. Reduce the fraction if possible.

Example: $65\% = \frac{65}{100} = \frac{13}{20}$

To a ratio. Convert to a common fraction first.

Example: $\frac{1}{10}\%$ or $.1\% = \frac{\frac{1}{10}}{100} = \frac{1}{1000} = 1{:}1000$

From a ratio . . .

To a common fraction. Express as a numerator and denominator.

Example: $1{:}3 = \frac{1}{3}$

To a decimal fraction. Carry out the division of the common fraction.

Example: $1{:}3 = \frac{1}{3} = \begin{array}{r} .333 \\ 3\overline{)1.000} \end{array} = .333$

To a percent. If equivalent fraction has a denominator that can be readily changed to hundredths, do so. Otherwise divide as above and move the decimal point two places to the right.

Examples: $3{:}10 = \frac{3}{10} = \frac{30}{100} = 30\%$

$1{:}3 = .333 = 33.3\%$

Fill in the following chart with the equivalent expressions:

Percent	Common fraction	Decimal fraction	Ratio
		0.5	
			1:10
85%			
			7:20
		0.001	
	2/3		
1/5%			
		0.2	
			1:200
75%			
	6/5		
1.5%			
	1/5000		
		0.0025	
	3/25		
.2%			
			2:50

Exercise in Mixing According to Specified Percentages and Ratios

1. Prepare a 10% sodium solution.

   a. Weigh 10 g of salt (NaCl).
   b. Place the salt in graduate.
   c. Add enough water to equal 100 cm^3 (ml). (Read measurement at the bottom of the miniscus.)

   Why would it be incorrect to start with 100 cm^3 of water and add the salt to it?

   ____

   ____

   ____

   ____

2. Mix a 1:10 dye solution.

   a. Measure 1 oz. of dye.
   b. Mix with 10 oz. of water.
   c. Note the resulting amount of solution.

   Total resulting solution = _______ cm^3 = _______ oz.

3. What would result if a dental assistant confused a percentage solution mixture with a ratio mixture?

   ____

   ____

   ____

   ____

   ____

Temperature

Using the containers provided, read and record the following temperatures in both Fahrenheit and Celsius:

Liquid	°C	°F
Warm water from the conditioner bath		
Cold tap water		
Room-temperature water		

Immerse a small laboratory jar into the hot water from a hot-water source. Allow it to be immersed for one full minute. Remove the jar and fill with 10 cm^3 of room-temperature water. Record the temperature readings below:

Water	°C	°F
Water temperature after 30 seconds		
Water temperature after 60 seconds		
Water temperature after 120 seconds		

Was there any significant change between the time spans?

Why or why not?

Write the formula for conversion of Celsius to Fahrenheit:

Write the formula for conversion of Fahrenheit to Celsius:

Change 80°F to Celsius, using the formula of conversion. Show all mathematical work and correctly label answer.

Answer ____________________

Change 50°C to Fahrenheit, using the formula of conversion. Show all mathematical work and correctly label answer.

Answer ____________________

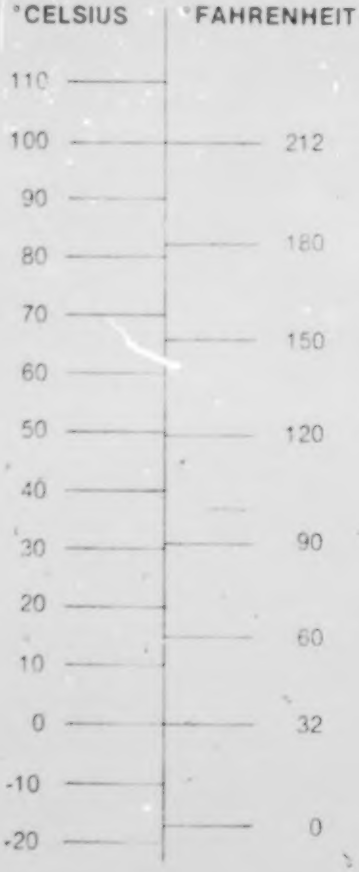
APPROXIMATE EQUIVALENT WEIGHTS AND MEASURES

Household	Liquid Measure Metric	Apothecaries
1 drop		1 minim (m.)
15 drops	1 milliliter or cm^3	15 minim
1 teaspoon (tsp.)	5 ml	1 fluid dram (fl. dr.)
1 dessertspoon	8 ml	2 fluid drams
6 tsp. or 2 tbsp.	30 ml	1 fluid ounce
2 measuring cups	500 ml	1 pint (pt.) (16 fl. oz.)
4 measuring cups	1000 ml or 1 liter	1 quart (qt.) or 2 pints

Weight Metric	Apothecaries
1.0 g	15 grains
4 g	60 gr. or 1 dram (dr)
15 g	4 drams
30 g	1 oz.

* Liquid Measure	Metric Units	Apothecaries Units
Liquid Measure *	cm^3 (cubic centimeters) milliliters	mimims, fluid drams, fluid ounces
Weight	milligrams, grams, kilograms	grains, drams, ounces

Temperature Conversion Chart



Subdivisions or fractions of the basic units are expressed by adding the following prefixes:

deci = 1/10 of a unit
centi = 1/100 of a unit
milli = 1/1000 of a unit
kilo = 1000 times unit

---

*In measuring volume of liquids and solids, a milliliter (ml) is exactly equal to one cubic centimeter (cm^3).

Introduction:

On the following pages is a student *Food Diary* specifically set up for a total of five days. These must be completed prior to any other nutrition laboratory sessions.

Objectives:

Using the *Food Diary* Sheets, complete the forms for five consecutive days by listing all food consumed during that period. Each column represents one day's consumption. Be sure to add all in-between-meals snacks, candy, etc., omitting only coffee and/or tea if drunk without cream, milk, or sugar. Write the approximate amounts (e.g., glasses, ounces, etc.) in the specified column.

Equipment:

Food Diary sheets

15

FOOD DIARY

Student: ______________________

Evaluator: ______________________

Date: ______________________

Day: ______

Before Breakfast	Amount
Breakfast	
Between	
Lunch	
Between	
Supper	
After Supper	

Day: ______

Before Breakfast	Amount
Breakfast	
Between	
Lunch	
Between	
Supper	
After Supper	

Day: ____________

Before Breakfast	Amount
Breakfast	
Between	
Lunch 16	
Between	
Supper	
After Supper	

Day: ____________

Before Breakfast	Amount
Breakfast	
Between	
Lunch	
Between	
Supper	
After Supper	

Day: ____________

Before Breakfast	Amount
Breakfast	
Between	
Lunch	
Between	
Supper	
After Supper	

Objectives:

1. Using the *Food Diary* of another student, tabulate the number of daily servings from each food group, as provided for on the Evaluation of Dietary Adequacy Sheet I.

2. Transfer the information onto the Evaluation of Dietary Adequacy Sheet II by adding up the number of servings per day in each group. Do not be afraid to use fractions.

3. Find the average of the five days' totals for each food group and also the average minus the MDS and place in the correct columns. The dietary adequacy is shown by these last figures. Negative numbers will indicate inadequacies.

4. From the completed evaluation of dietary adequacy which you have formulated for your patient (student), describe in typewritten-essay form whether this person had an adequate diet or whether she/he needs nutritional counseling. If all areas of nutrition are adequate, report such findings with the evidence.

   a. Identify the patient's (student's) eating habits and how specific eating patterns may contribute to her/his poor dental health.

   b. Coordinate the patient's (student's) eating habits with her oral hygiene habits.

   c. Develop an individual caries-prevention plan for the patient (student).

   Note: Nutrition projects will be graded according to the criteria sheet on page 20. Be sure your name is on all papers as the evaluator, and the patient's (student's) name also. These evaluations will be returned to you and then you will return them to the patient (student) who originally completed the Food Diary.

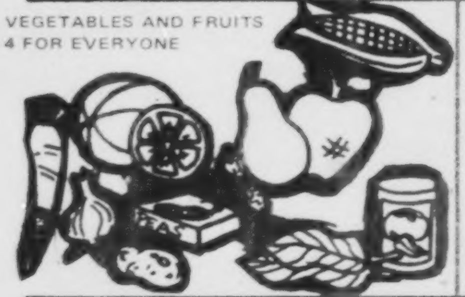
Equipment:

Evaluation of Dietary Adequacy Sheets I and II
Food Diary Sheets

EVALUATION OF DIETARY ADEQUACY I

EVERY DAY YOU NEED

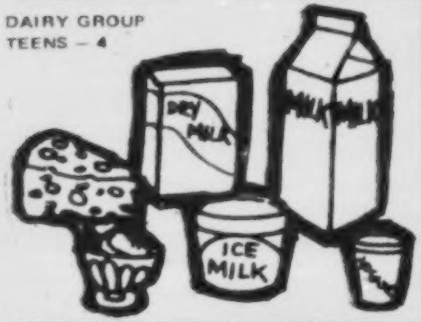
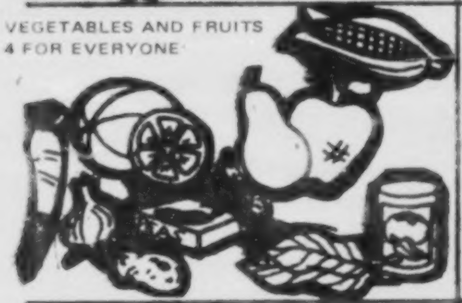
THE FOUR FOOD GROUPS

MINIMUM DAILY SERVINGS (MDS)	ONE SERVING IS	SERVINGS PER DAY					SUMMARY	
		DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	AVERAGE	AVERAGE MINUS MDS
DAIRY GROUP TEENS — 4 DRY MILK MILK MILK ICE MILK	8 oz. (1 cup) whole milk 8 oz. skim, lowfat, or 2% milk with vitamins A and D 1½ oz. (1½ slices) American or cheddar cheese 8 oz. yogurt or buttermilk 1½ cups ice cream or ice milk Amounts of above used in cooking should be recognized.							
MEAT GROUP 2 FOR EVERYONE PEANUT BUTTER COTTAGE CHEESE DRIED BEANS	2-3 ounces lean cooked meat, chicken, fish 2 eggs 4 tablespoons peanut butter 1 cup (cooked) dry beans or peas 3 small packages or ½ cup nuts ½ cup cottage cheese							
VEGETABLES AND FRUITS 4 FOR EVERYONE 	½ cup of dark green vegetables ½ cup of other vegetable 1 med. apple, banana, orange, or potato ½ cup orange, grapefruit, or "C" enriched juices ½ med. grapefruit, cantaloupe. Juice of 1 lemon Include good sources of vitamin A and C daily.							
BREADS AND CEREALS 4 FOR EVERYONE RICE FLOUR OATS SPAGHETTI	1 slice enriched bread ½ cup cooked cereal ½ cup macaroni, spaghetti, rice 1 oz. (¾ cup) dry cereal 6 2" X 2" saltine crackers							

EVALUATION OF DIETARY ADEQUACY II

EVERY DAY YOU NEED:

THE FOUR FOOD GROUPS

MINIMUM DAILY SERVINGS (MDS)	ONE SERVING IS	SERVINGS PER DAY					SUMMARY	
		DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	AVERAGE	AVERAGE MINUS MDS
DAIRY GROUP TEENS — 4 	8 oz. (1 cup) whole milk 8 oz. skim, lowfat, or 2% milk with vitamins A and D 1½ oz. (1½ slices) American or cheddar cheese 8 oz. yogurt or buttermilk 1½ cups ice cream or ice milk Amounts of above used in cooking should be recognized.							
MEAT GROUP 2 FOR EVERYONE PEANUT BUTTER COTTAGE CHEESE DRIED BEANS	2-3 ounces lean cooked meat, chicken, fish 2 eggs 4 tablespoons peanut butter 1 cup (cooked) dry beans or peas 3 small packages or ½ cup nuts ½ cup cottage cheese							
VEGETABLES AND FRUITS 4 FOR EVERYONE 	½ cup of dark green vegetables ½ cup of other vegetables 1 med. apple, banana, orange, or potato ½ cup orange, grapefruit, or "C" enriched juices ½ med. grapefruit, cantaloupe. Juice of 1 lemon Include good sources of vitamin A and C daily.							
BREADS AND CEREALS 4 FOR EVERYONE RICE FLOUR OATS SPAGHETTI	1 slice enriched bread ½ cup cooked cereal ½ cup macaroni, spaghetti, rice 1 oz. (¾ cup) dry cereal 6 2" × 2" saltine crackers							

Criteria Sheet for Food Diary Nutrition Laboratory

Evaluator ______________________ Date ____________

Patient (Student) ______________________

		Possible	Score
1.	Paper typewritten	10	
* 2.	Evaluation sheet correctly tabulated for each day (-4 for each error)	20	
* 3.	Evaluation sheet correctly calculated for summary average (-4 for each error)	16	
* 4.	Evaluation sheet correctly calculated for summary average minus MDS (-4 for each error)	16	
* 5.	Coordination of patient's (student's) eating habits with her oral hygiene habits	10	
* 6.	A working prevention plan developed in a professional manner	20	
7.	Evaluator's name on all papers	4	
8.	Patient's (student's) name on all papers.	4	
	Total Score	100	

Comments: ____

____

____

____

____

* Crucial performance items

Tips for Improving the Diet

Patient Name: ______________________ Date: __________

Evaluator: ______________________

- The four food groups provide only about 1200 calories a day if the minimum daily amounts are selected.

- Remaining calories may come from further servings of food-group items or from foods not included in these groups. To give interest, variety, color, and flavor to meals, butter or margarine, sweets, fats, oils, etc. can be included. To control body weight, these must be limited.

- Read all labels on processed foods. Look for vitamin-enriched foods and also foods with fewer preservatives.

- The Minimum Daily Servings provide all the protein, vitamins, and minerals you normally need without supplementary foods and/or vitamins.

- Balanced meals are really the best type of meal to prepare: attempt to have one item from each food group at each mealtime. Avoid in-between snacks (especially sugar products).

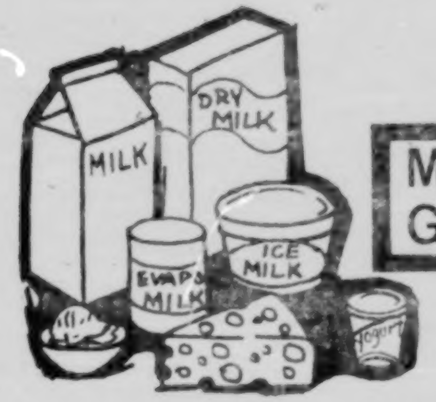
- To evaluate and instruct patient in good nutritional practices, the dental assistant must practice good eating habits herself.

- Be aware of economically good "food buys," so that you can suggest such meals to an economically deprived mother. Many meals can be purchased which are very reasonable in cost yet cover all items needed to maintain the Minimum Daily Servings within each food group. Some economical yet nutritious foods are:

  Dry milk
  Dry beans and peas
  Peanut butter
  Some canned fish – tomato sardines, mackerel, etc.
  Some frozen fish
  Fresh vegetables in season
  Fresh fuits in season
  Frozen orange juice
  "Beyond-fresh-date" breads
  "House brands" of various foods

A Guide to Good Eating

Use Daily:


MILK
DRY MILK
ICE MILK
EVAP. MILK
Yogurt

Milk Group

3 or more glasses milk — Children
smaller glasses for some children under 8

4 or more glasses — Teenagers

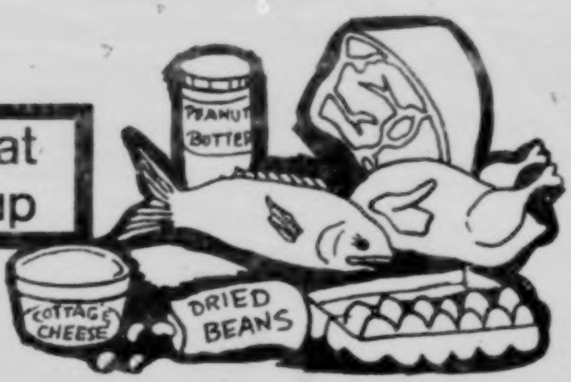
2 or more glasses — Adults

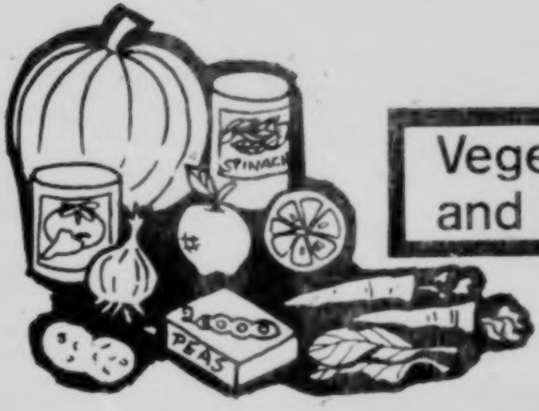
Cheese, ice cream and other milk-made foods can supply part of the milk

Meat Group

2 or more servings

Meats, fish, poultry, eggs, or cheese—with dry beans, peas, nuts as alternates


PEANUT BUTTER
COTTAGE CHEESE
DRIED BEANS


SPINACH
PEAS

Vegetables and Fruits

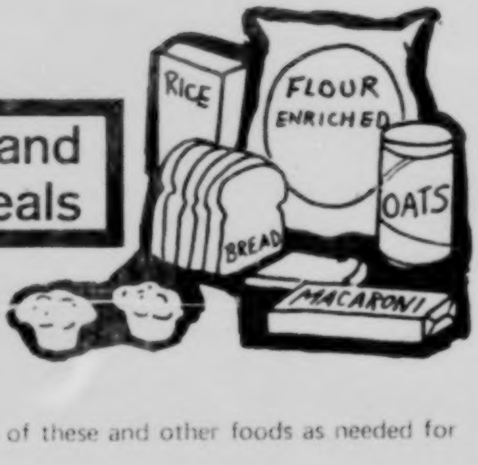
4 or more servings

Include dark green or yellow vegetables; citrus fruit or tomatoes

Breads and Cereals

4 or more servings

Enriched or whole grain
Added milk improves nutritional values


RICE
FLOUR ENRICHED
OATS
BREAD
MACARONI

This is the foundation for a good diet. Use more of these and other foods as needed for growth, for activity, and for desirable weight.

So you think you don't eat much sugar?

Here are the approximate amounts of refined sugar (added sugar, in addition to the sugar naturally present) hidden in popular foods.

Food Item	Size Portion	Approximate Sugar Content in Teaspoonful of Granulated Sugar
Beverages		
cola drinks	1 (6 oz bottle or glass)	3½
cordials	1 (¾ oz glass)	1½
ginger ale	6 oz	5
highball	1 (6 oz glass)	2½
orangeade	1 (8 oz glass)	5
root beer	1 (10 oz bottle)	4½
Seven-Up*	1 (6 oz bottle or glass)	3¾
soda pop	1 (8 oz bottle)	5
sweet cider	1 cup	6
whiskey sour	1 (3 oz glass)	1½
Cakes and Cookies		
angel food	1 (4 oz piece)	7
apple sauce cake	1 (4 oz piece)	5½
banana cake	1 (2 oz piece)	2
cheese cake	1 (4 oz piece)	2
choc. cake (plain)	1 (4 oz piece)	6
choc. cake (iced)	1 (4 oz piece)	10
coffee cake	1 (4 oz piece)	4½
cup cake (iced)	1	6
fruit cake	1 (4 oz piece)	5
jelly roll	1 (2 oz piece)	2½
orange cake	1 (4 oz piece)	4
pound cake	1 (4 oz piece)	5
sponge cake	1 (1 oz piece)	2
brownies (unfrosted)	1 (¾ oz)	3
chocolate cookies	1	1½
Fig Newtons*	1	5
gingersnaps	1	3
macaroons	1	6
nut cookies	1	1½
oatmeal cookies	1	2
sugar cookies	1	1½
chocolate eclair	1	7
cream puff	1	2
donut (plain)	1	3
donut (glazed)	1	6
Candies		
average choc. milk bar	1 (1½ oz)	2½
chewing gum	1 stick	½
chocolate cream	1 piece	2
butterscotch chew	1 piece	1
chocolate mints	1 piece	2
fudge	1 oz square	4½
gumdrop	1	2
hard candy	4 oz	20
Lifesavers*	1	⅓
peanut brittle	1 oz	3½
Canned Fruits and Juices		
canned apricots	4 halves and 1 T syrup	3½
canned fruit juices (sweet)	½ cup	2
canned peaches	2 halves and 1 T syrup	3½
fruit salad	½ cup	3½
fruit syrup	2 T	2½
stewed fruits	½ cup	2
Dairy Products		
ice cream	⅓ pt (3½ oz)	3½
ice cream cone	1	3½
ice cream soda	1	5
ice cream sundae	1	7
malted milk shake	1 (10 oz glass)	5
Jams and Jellies		
apple butter	1 T	1
jelly	1 T	4-6
orange marmalade	1 T	4-6
peach butter	1 T	1
strawberry jam	1 T	4
Desserts, Miscellaneous		
apple cobbler	½ cup	3
blueberry cobbler	½ cup	3
custard	½ cup	2
french pastry	1 (4 oz piece)	5
fruit gelatin	½ cup	4½
apple pie	1 slice (average)	7
apricot pie	1 slice	7
berry pie	1 slice	10
butterscotch pie	1 slice	4
cherry pie	1 slice	10
cream pie	1 slice	4
lemon pie	1 slice	7
mince meat pie	1 slice	4
peach pie	1 slice	7
prune pie	1 slice	6
pumpkin pie	1 slice	5
rhubarb pie	1 slice	4
banana pudding	½ cup	2
bread pudding	½ cup	1½
chocolate pudding	½ cup	4
cornstarch pudding	½ cup	2½
date pudding	½ cup	7
fig pudding	½ cup	7
Grapenut* pudding	½ cup	2
plum pudding	½ cup	4
rice pudding	½ cup	5
tapioca pudding	½ cup	3
berry tart	1 cup	10
blancmange	½ cup	5
brown Betty	½ cup	3
plain pastry	1 (4 oz piece)	3
sherbet	½ cup	9
Syrups, Sugars and Icings		
brown sugar	1 T	*3
chocolate icing	1 oz	5
chocolate sauce	1 T	3½
corn syrup	1 T	*3
granulated sugar	1 T	*3
honey	1 T	*3
Karo* syrup	1 T	*3
maple syrup	1 T	*5
molasses	1 T	*3½
white icing	1 oz	*5

*actual sugar content

Makers of Calcident* tablets

Topic 4 The Dental Assistant's Role in the Administration of Local Anesthetics

Introduction:

The dental assistant has no responsibility in the actual selection or administration of dental anesthesia; however, she/he should be familiar with this procedure. The assistant's responsibility will be in assembling the syringe and other anesthetic equipment. Only local anesthesia will be covered in this session. For topical and/or general anesthesia, the dental assistant must refer to other textbooks and/or reference materials.

Objectives:

1. Given an anesthetic syringe, carpule, and needle, correctly assemble for use.
2. Describe in writing the difference between an aspirating and non-aspirating syringe.
3. Given a diagram of an aspirating syringe, correctly label its parts.
4. State, in writing, the differences and uses of a 1-inch needle as opposed to a 1 5/8-inch needle.
5. Given the injection site, state the type of syringe, needle size and length, and injection type to be administered.
6. Given the type of syringe, needle size and length, state the possible areas for injection.
7. List the steps involved in preparing an anesthetic syringe for injection.
8. List and describe in writing two precautions which must be taken when working with anesthetic-injection equipment.
9. Define carpule.
10. Given actual anesthetic equipment, correctly identify and give the use of each piece.
11. Define anesthesia.

Equipment:

Syringes
Carpules
1-inch needles
Additional reference texts
Laboratory worksheets
2X2" gauze pads
Disinfectant
1 5/8-inch needles
Anatomical skulls (optional)

Determining the Type of Anesthesia Setup to be Used:

The type of anesthetic syringe, needle, and carpule will depend upon the following:

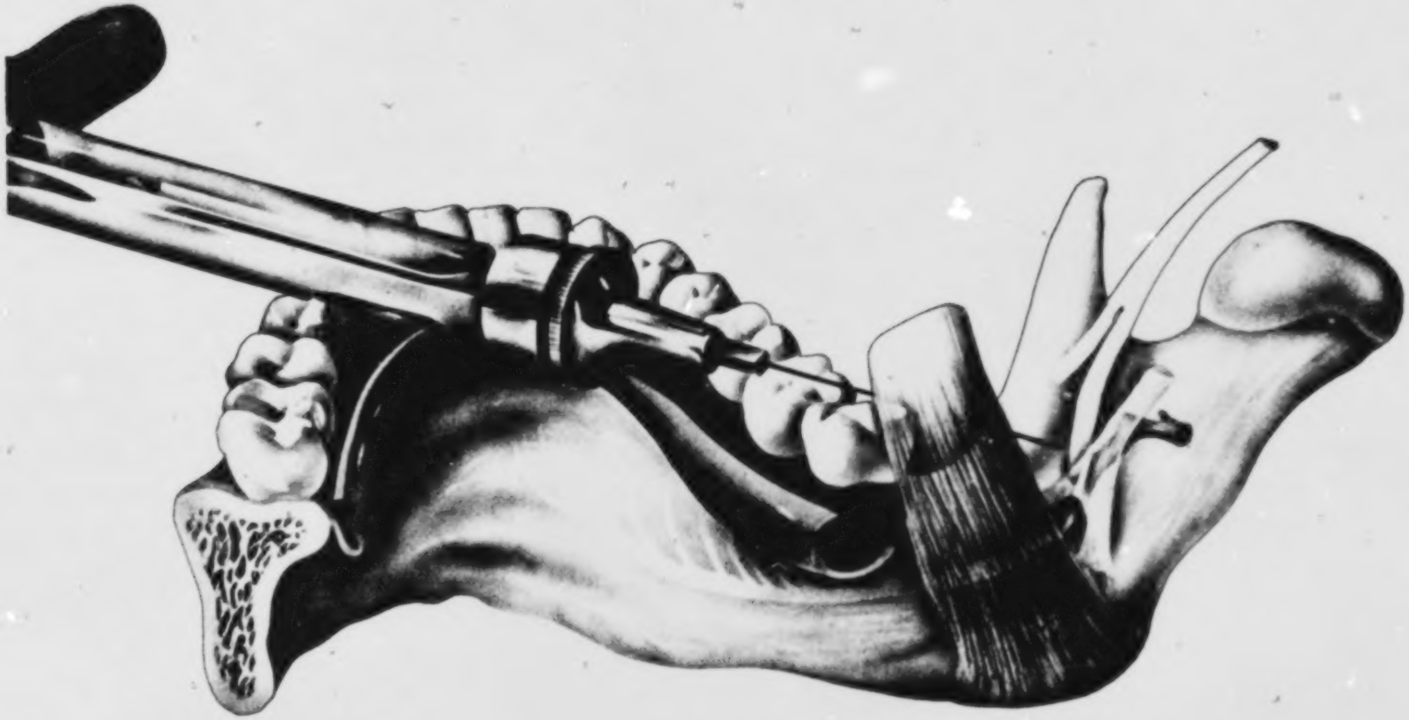
a. Teeth to be anesthetized

b. Location of the injection

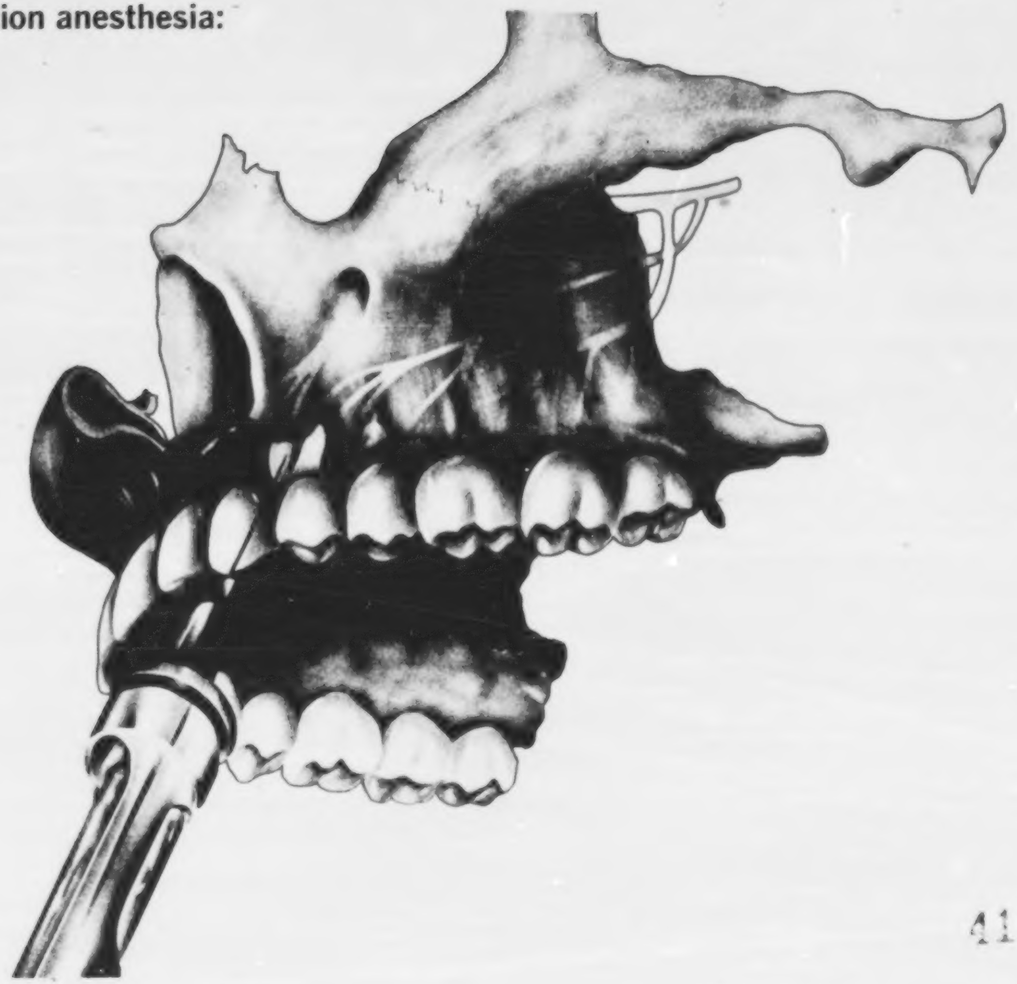
c. Type of injection technique

Teeth To Be Anesthetized	Injection Technique	Innervation	Needle Size	Gage	Injection Site	Syringe Type
Maxillary Incisors	Infiltration	Anterior superior alveolar nerve	1 inch	27	Facial – mucobuccal fold over tooth apex Palatal – incisive foramen	Non-aspirating
Maxillary Cuspids	Infiltration	Anterior superior alveolar nerve	1 inch	27	Facial – mucobuccal fold over tooth apex Palatal – incisive foramen	Non-aspirating
Maxillary Bicuspids	Infiltration	Middle superior alveolar nerve	1 inch	27	Buccal – mucobuccal fold over tooth apex	Non-aspirating
		Infraorbital nerve	1 5/8 inch	27		
Maxillary Molars	Infiltration	Posterior superior alveolar nerve	1 inch	27	Buccal – mucobuccal fold over tooth apex Palatal – palatine foramen	Non-aspirating
Mandibular Incisors	Infiltration	Incisive nerve Inferior alveolar nerve	1 inch	27	Mental foramen muccobuccal fold	Non-aspirating
Mandibular Cuspids	Infiltration	Mental nerve Inferior alveolar nerve	1 inch	27	Mental foramen muccobuccal fold	Non-aspirating
Mandibular Biscuspids	Infiltration	Inferior alveolar nerve	1 inch	27	Muccobuccal fold adjacent to tooth	Non-aspirating
	Block	Inferior alveolar nerve	1 5/8 in.	27	Mandibular foramen	Aspirating
Mandibular Molars	Block	Inferior alveolar nerve	1 5/8 in.	27	Mandibular foramen	Aspirating

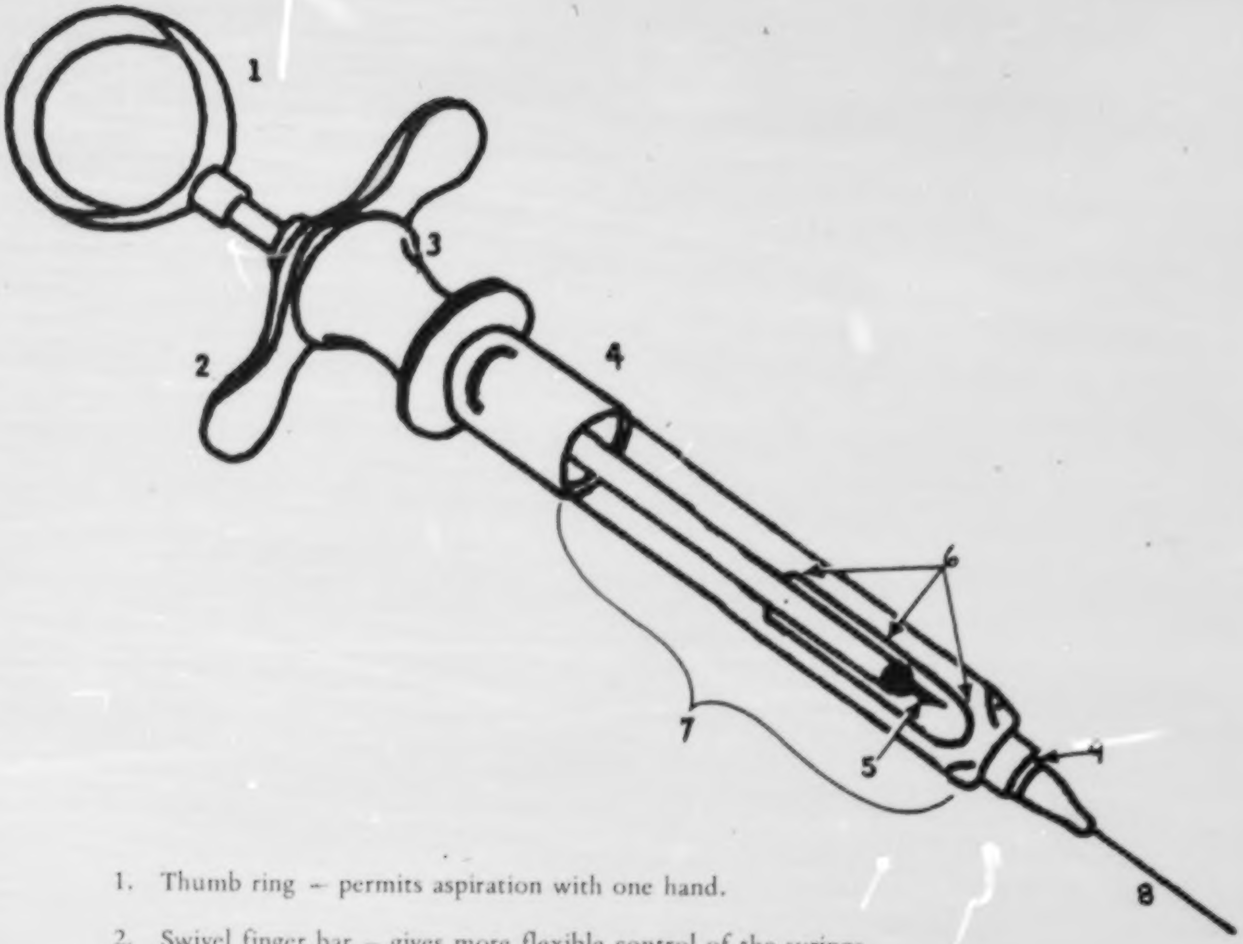
For mandibular block anesthesia:



For infiltration anesthesia:



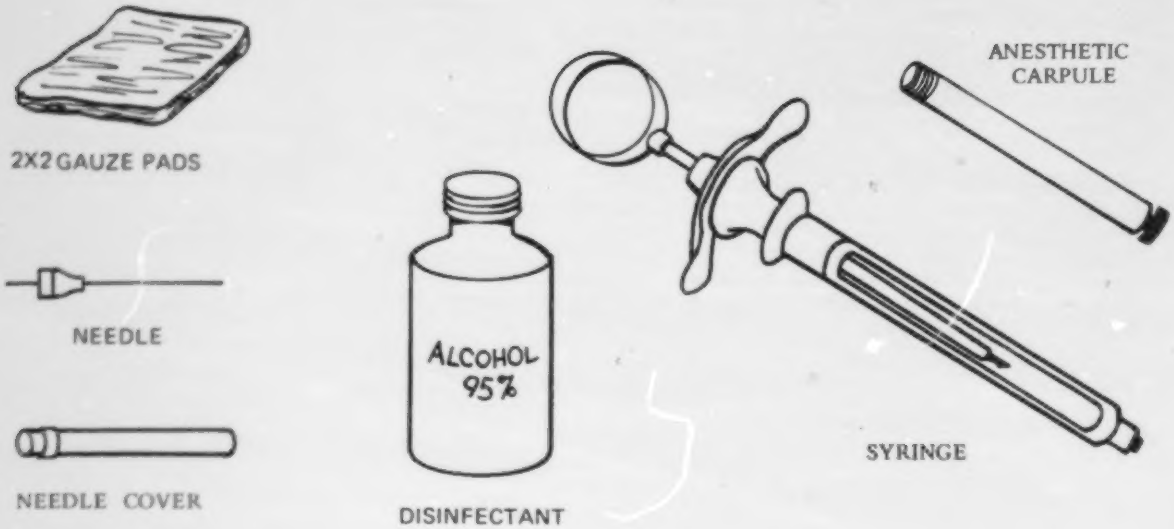
The Anesthetic Syringe



1. Thumb ring – permits aspiration with one hand.
2. Swivel finger bar – gives more flexible control of the syringe.
3. Spool finger grip – provides positive grip for aspirating.
4. Spring lock – centers and holds carpules firmly in syringe.
5. Harpoon or piston rod – when properly imbedded in rubber plunger, permits gentle retraction and positive aspiration.
6. Open side of barrel for faster loading and unloading.
7. Barrel
8. Pre-sterilized needle
9. Needle hub

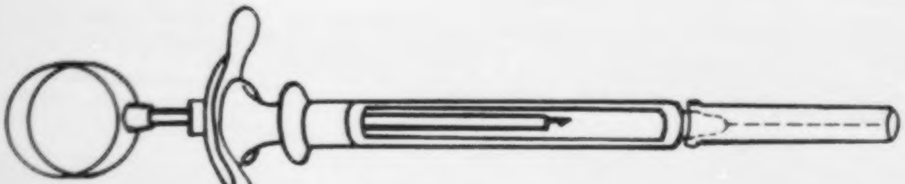
Directions for Aspirating Syringe Setup

Equipment :

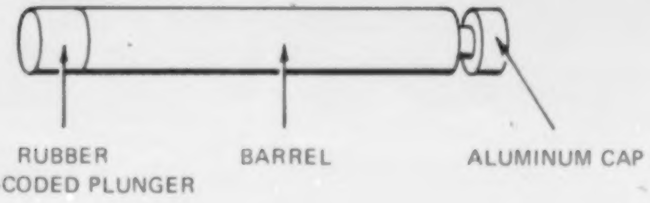

ANESTHETIC CARPULE
2X2 GAUZE PADS
NEEDLE
ALCOHOL 95%
SYRINGE
NEEDLE COVER
DISINFECTANT

Procedure:

1. Determine type of anesthesia, location, and amount.
   - a. *In all cases the dentist will determine this.*
   - b. Once the information is known, wash hands thoroughly with soap and water, rinse, and dry.
2. Collect all necessary equipment.
3. Assemble syringe.
   - a. Attach disposable needle by breaking the seal off the hub end of needle.
   - b. Screw hub portion of needle into barrel end of syringe. *Do not contaminate needle by removing cover.*
   - c. Be sure needle is tightened securely and has not become bent during placement.

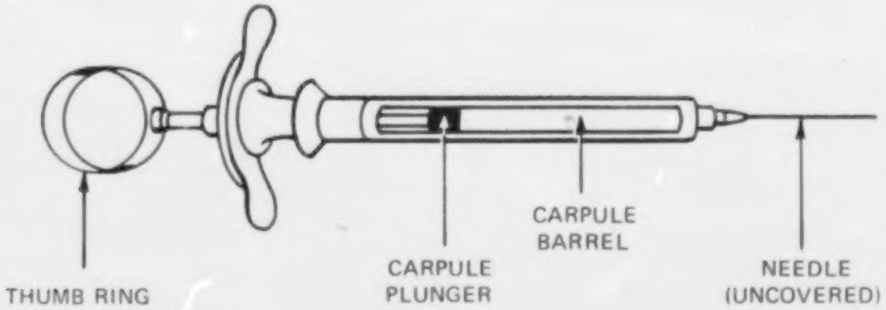


d. Double-check to see that you have selected the correct anesthetic solution carpule. (The name and strength of the anesthesia is written directly on the carpule barrel; also, the rubber plungers are color-coded for easier identification.)


RUBBER
COLOR-CODED PLUNGER
BARREL
ALUMINUM CAP

e. Wipe the aluminum-cap end of the anesthetic carpule with a 2×2" gauze pad saturated in disinfectant.

f. Insert the anesthetic carpule into the open side of barrel by pulling back on the swivel ring and placing the carpule in (capped end first). Once the carpule is properly seated within the barrel, engage the harpoon into the rubber plunger of the carpule by firmly pushing the thumb ring towards the needle.


THUMB RING
CARPULE
PLUNGER
CARPULE
BARREL
NEEDLE
(UNCOVERED)

g. Remove needle cap carefully. *Do not discard needle cap.*

h. Expel any air from the carpule by pushing plunger. A small amount of anesthetic solution will be forced through the needle.

i. Replace the needle cap carefully so as not to bend or damage the needle in any way.

j. Place completely assembled aspirating syringe on trap setup.

Clean-up

a. Remove and discard the used anesthetic carpule by pulling back on thumb ring and disengaging the carpule.

b. All carpules are discarded – *never* reused (even if the carpule was only partially used).

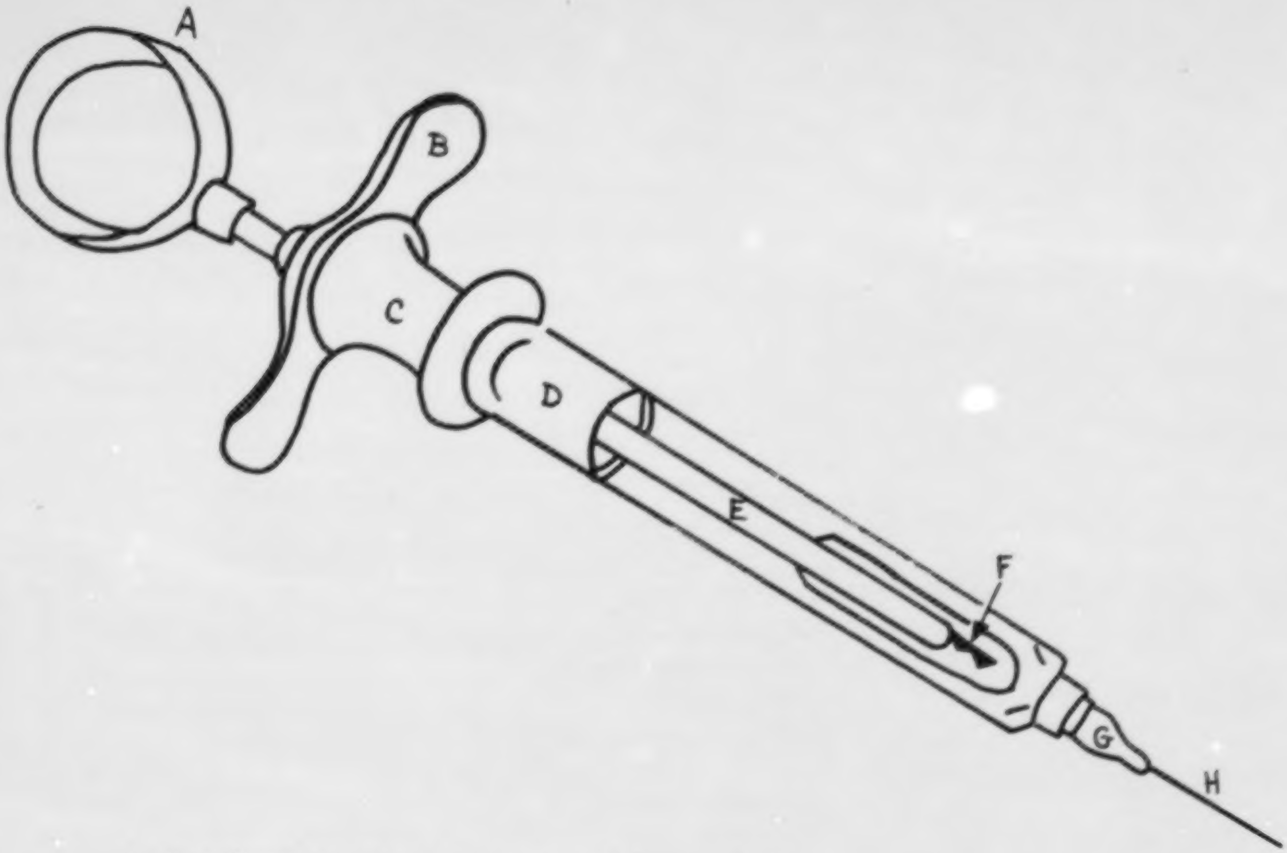
c. Remove the needle by unscrewing at the hub.

d. Break the needle at the hub and discard in the proper receptacle.

e. Properly scrub and rinse syringe, then autoclave for next use.

Laboratory Exercise – Local Anesthetic

Name ______________________________ Date ____________



1. – 8. Referring to the above diagram of an anesthetic syringe, place the name of each part next to the corresponding letter:

A. ______________________________
B. ______________________________
C. ______________________________
D. ______________________________
E. ______________________________
F. ______________________________
G. ______________________________
H. ______________________________

9. Define aspirating: ______________________________

____

____

10. What situations would indicate the use of a 1-inch needle?

____

____

11. What situations would indicate the use of a 1 5/8-inch needle?

____

____

Listed below are injection sites. State the type of syringe needed for each:

12. mandibular right molar ______________________________
13. mandibular central incisor ______________________________
14. mandibular left cuspid ______________________________
15. maxillary central incisor ______________________________
16. maxillary first bicuspid ______________________________

List two precautions which the dental assistant must take when working with anesthetic syringes:

17. ______________________________
18. ______________________________
19. Define anesthesia: ______________________________

____

20. What disease can be readily contracted from contaminated needles?

____

21. What possible areas may an injection be given if the dentist utilizes a 27-gage 1 5/8" needle, aspirating syringe? ______________________________

____

____

22. Define carpule: ______________________________

____

____

Objectives:

1. Given illustrations of oral surgical instruments, identify each and describe its use.
2. During a practical application, correctly assemble an uncomplicated extraction tray, including the necessary armamentarium.
3. During a practical application, correctly assemble a surgical-extraction and bone-removal tray, including the necessary armamentarium.
4. List the armamentarium necessary for an uncomplicated extraction trap setup and also a surgical-extraction and bone-removal trap setup.
5. Describe in writing the difference between ligature and suture.

Equipment:

oral surgical tray setups
various oral surgical instruments
additional reference textbooks
oral surgical instrument packet

Uncomplicated Extraction Tray Setup

- periosteal elevator
- root elevator
- curette
- forceps indicated for that particular extraction site
- gauze pads
- tissue forceps
- mouth mirror
- explorer

Surgical Extraction and Bone Removal Tray Setup

- surgical scalpel
- surgical blades
- periosteal elevator
- bone chisel
- surgical bone burs
- surgical mallet
- root elevators
- forceps indicated for that particular extraction site
- Rongeur forceps
- bone file
- curette tissue forceps
- suture needle holder
- suture needle and material
- tissue scissors
- aspirator and surgical tip
- suture scissors
- gauze pads
- mouth mirror
- explorer

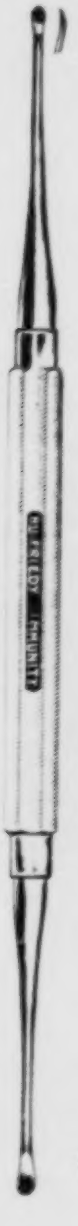
Surgical Curettes

Used as an exploratory instrument and to remove tooth particles or debris from sockets during an extraction. Also used to remove granulomas, cysts, abscesses, and neoplasms.

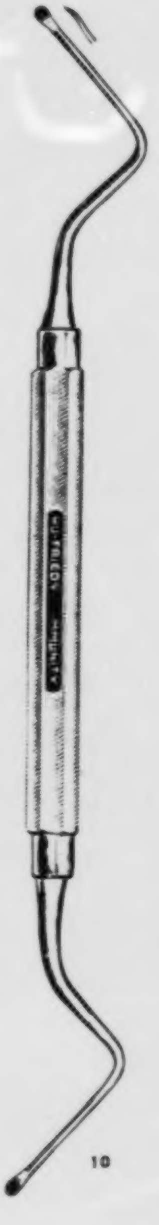
After the teeth are extracted, the curette is carefully passed into the socket for small bone particles, tooth structure, or particles of amalgam fillings.

The curette is helpful in outlining the exposed coronal portions and in determining where the bony tissue covers the tooth crown.

Curette nibs are spoon-shaped, and their shanks are angled to reach various areas of the mouth. Curettes should never be used as an elevator or lever, as they are not made for that purpose and will easily break.


HU-FRIEDY IMMUNITY

9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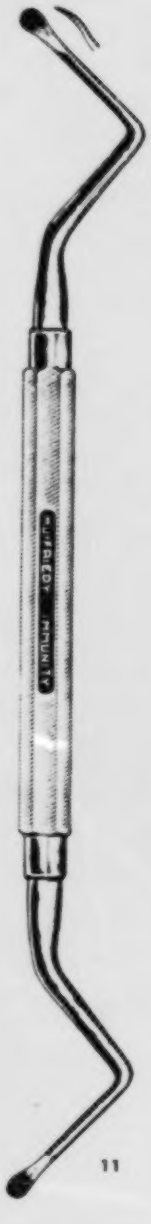
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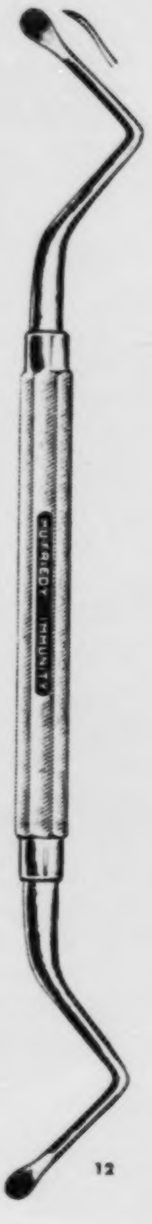
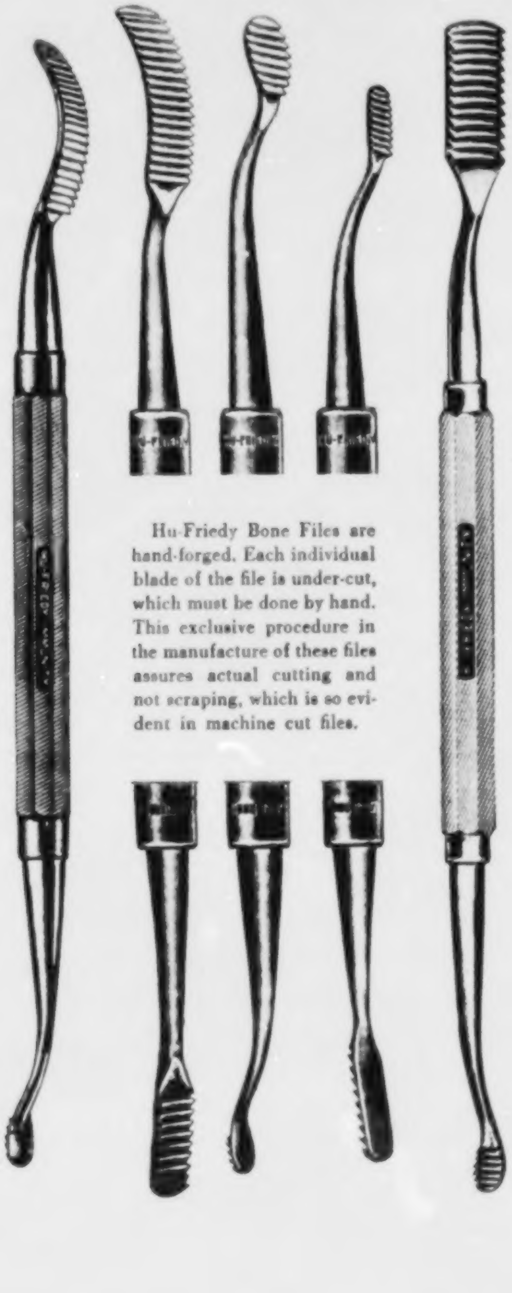

HU-FRIEDY IMMUNITY

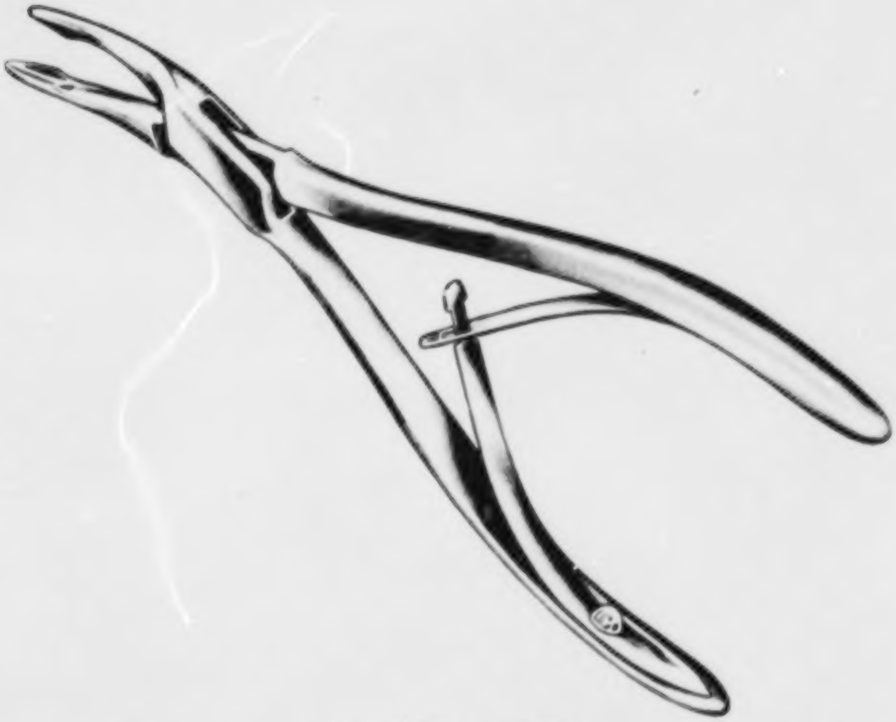
12

Bone Files

Bone files are used for smoothing the alveolar process. Files should be used in all cases where the process should be smoothed to promote healing and to prevent annoyances that might occur later from sharp spicules and rough edges of bone that are not removed. Pressure on the file causes it to engage the bone, and a pull toward the point of insertion removes rough, sharp spicules and leaves a clean, smooth surface. Bone files are sometimes called rasps.



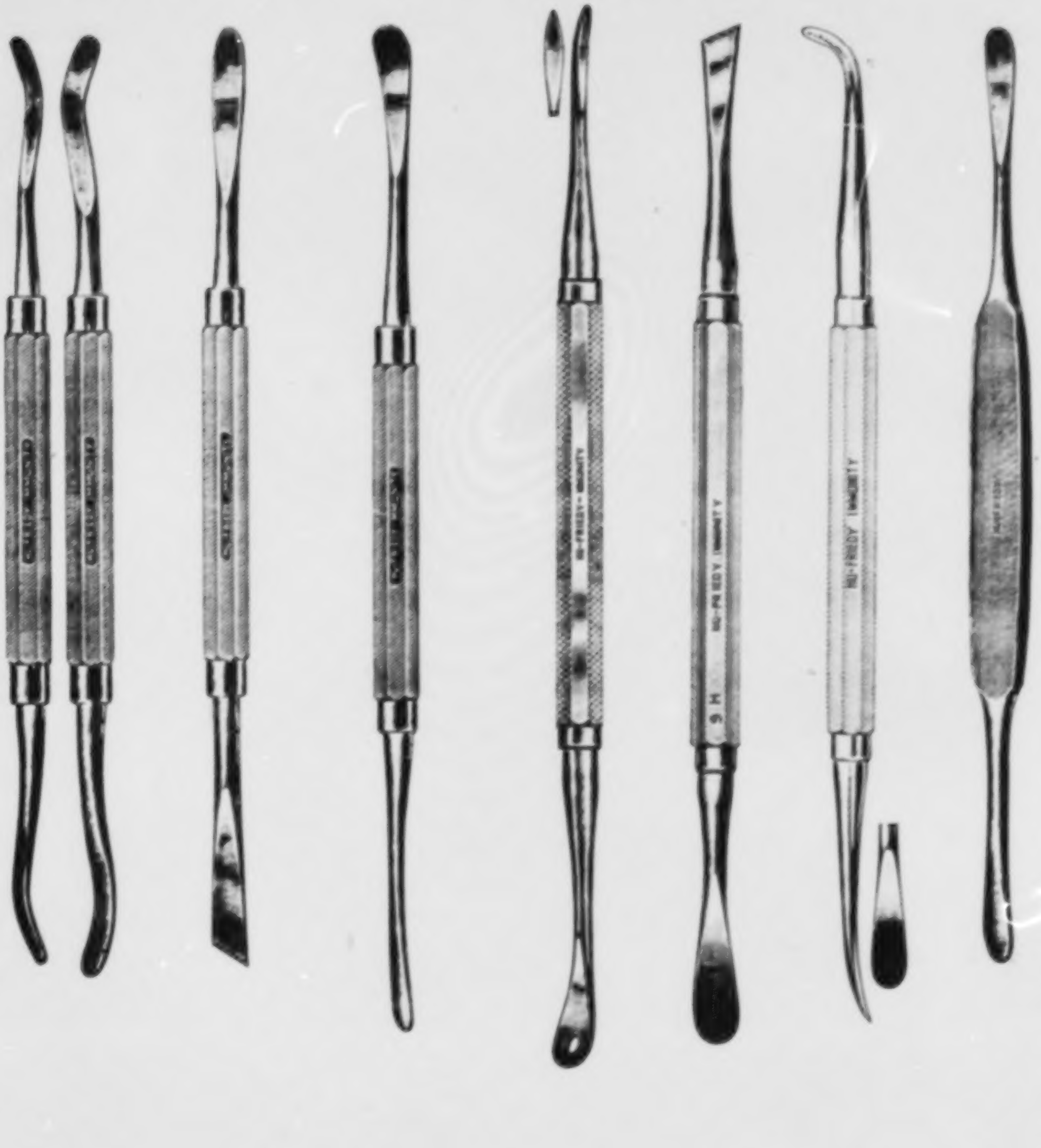
Hu-Friedy Bone Files are hand-forged. Each individual blade of the file is under-cut, which must be done by hand. This exclusive procedure in the manufacture of these files assures actual cutting and not scraping, which is so evident in machine cut files.



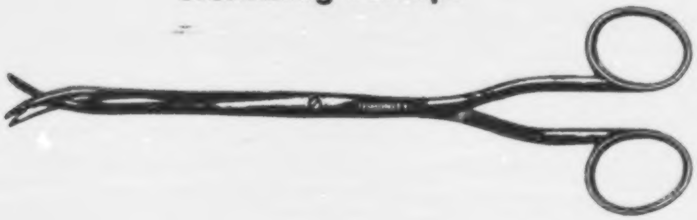
RONGEUR FORCEPS

Periosteal Membrane Elevators

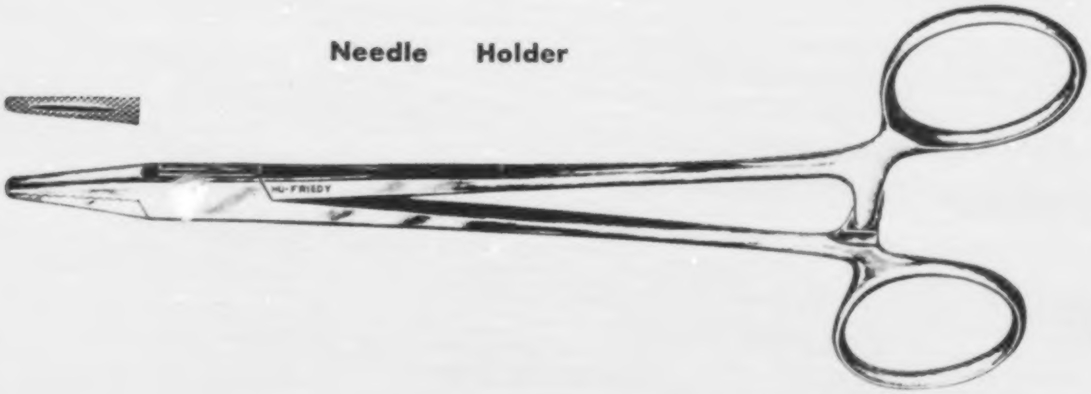
This instrument is used prior to the use of extraction forceps to loosen the tooth in the alveolar socket. It is also used for root removals, when it is necessary to expose the labial or cortical plate of bone underlying the opposite site adequately. This instrument reflects or retracts the soft-tissue covering. The mesial, buccal, or labial surface of the tooth is used as a fulcrum, and the interproximal tissue is then elevated from its location.

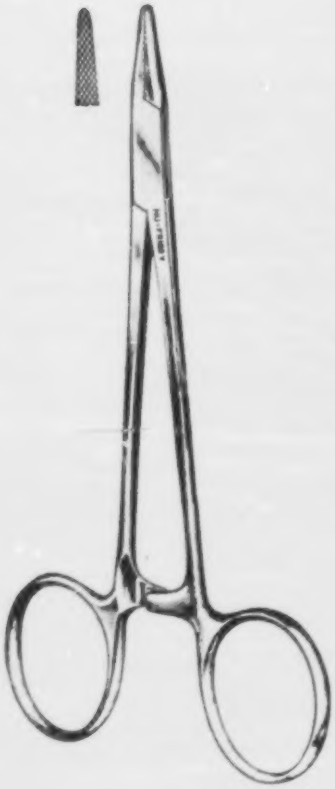

HU-FRIEDY IMMUNITY
HU-FRIEDY IMMUNITY
9 H
HU-FRIEDY IMMUNITY

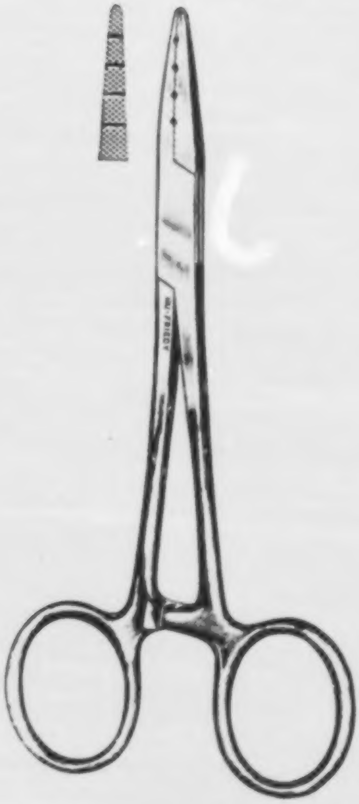
Sterilizing Forceps



Needle Holder

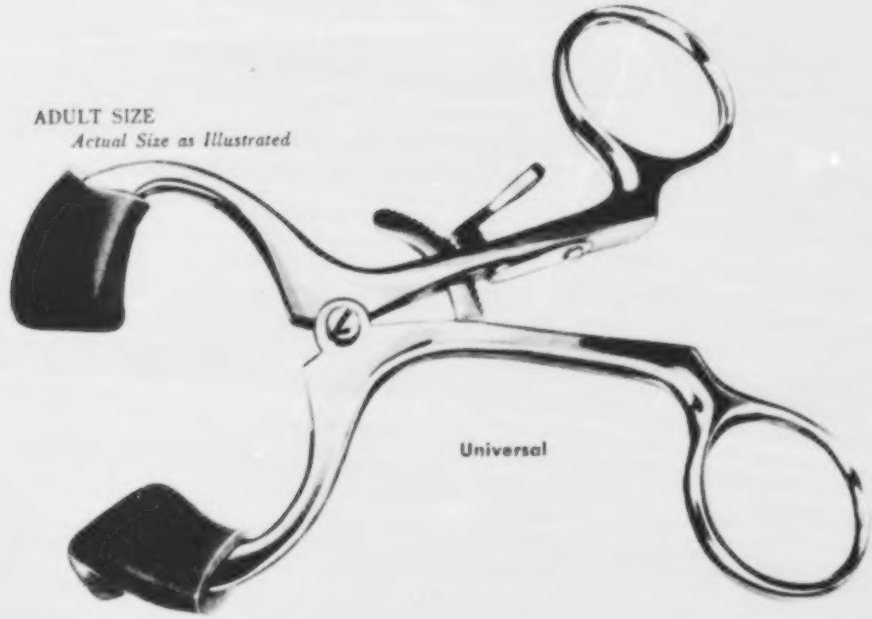




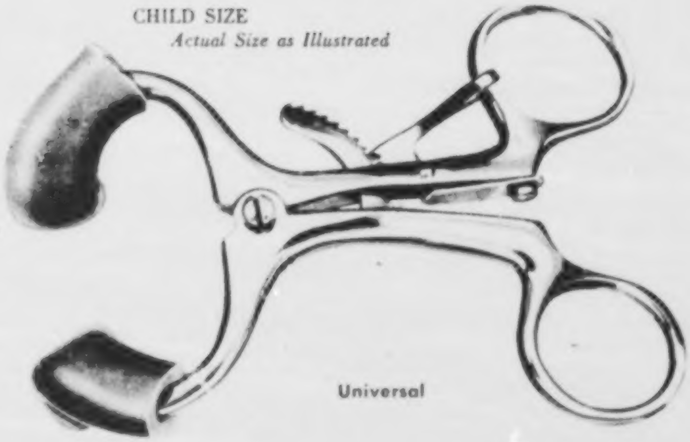


Mouth Gag

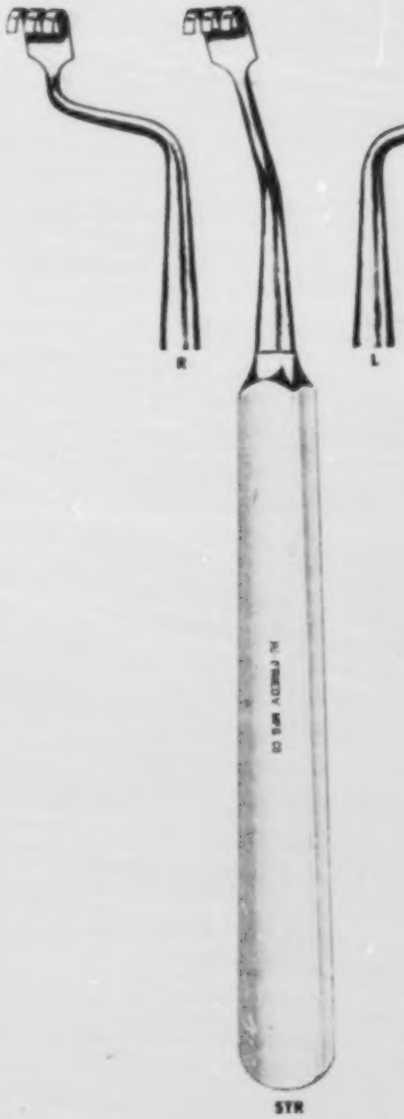
ADULT SIZE
Actual Size as Illustrated

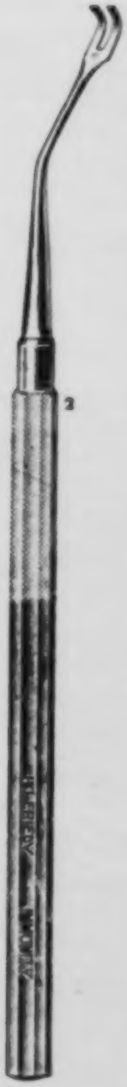


CHILD SIZE
Actual Size as Illustrated



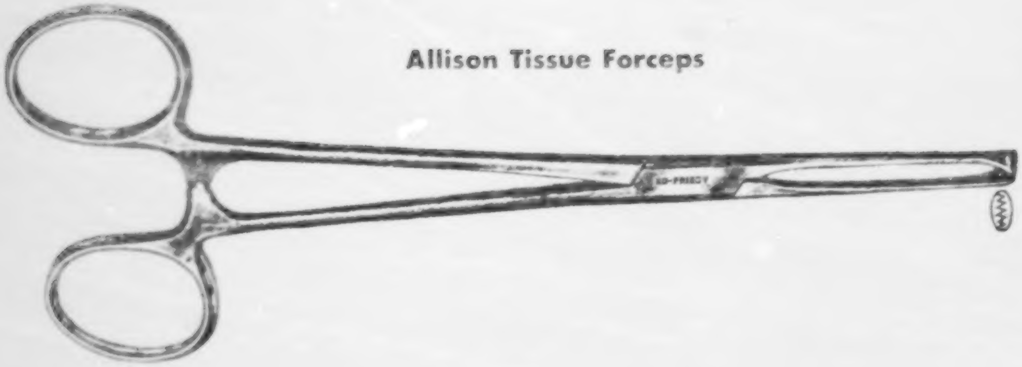
Tissue Retractors



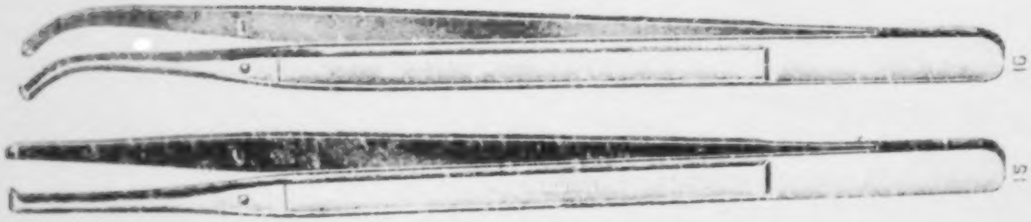


Three retractors which are distinctive in their efficiency when retraction of tissue in the third molar and anterior region is required.

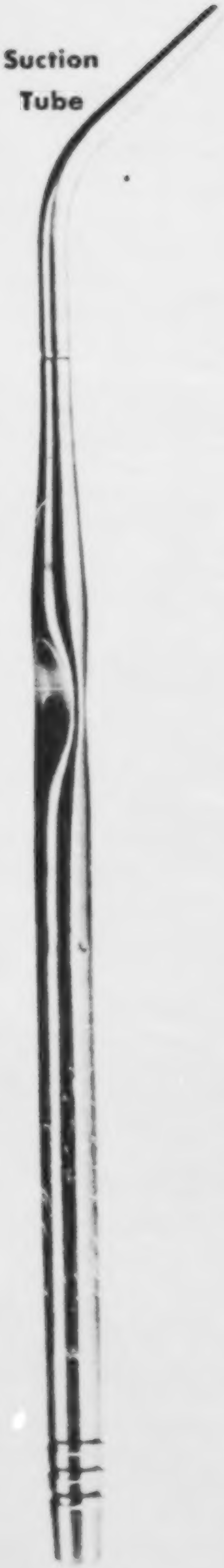
Allison Tissue Forceps



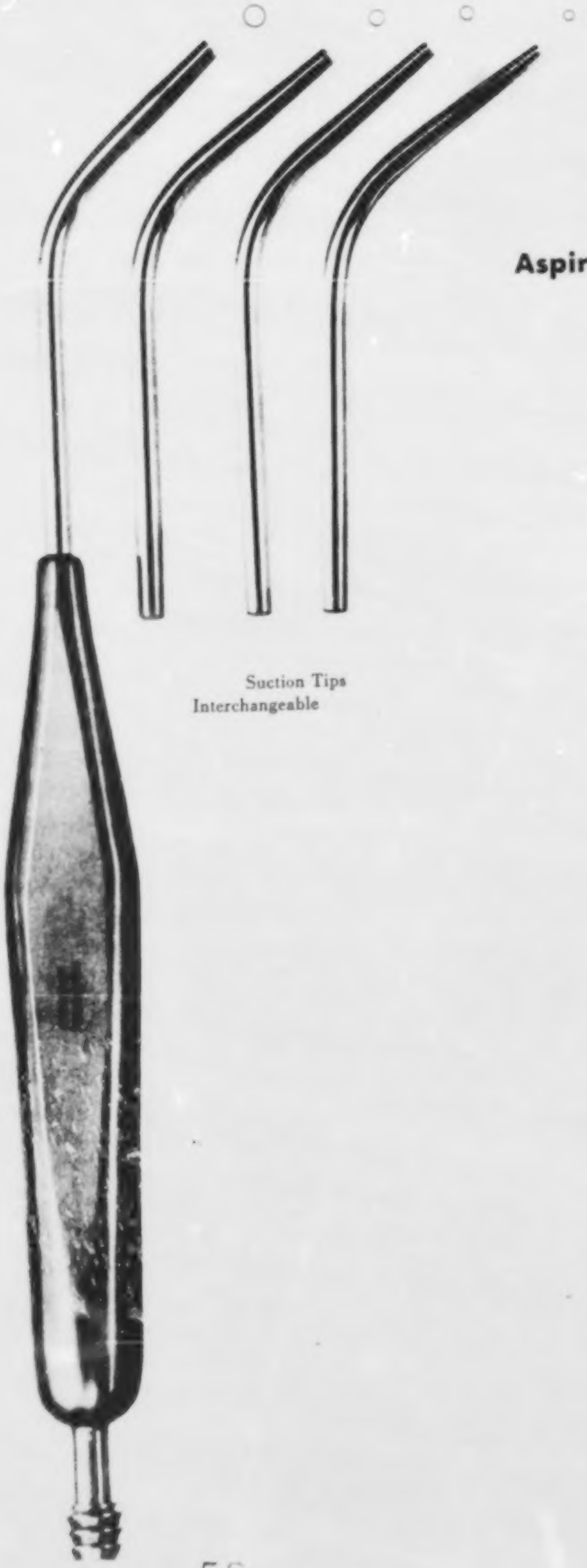
Tissue Forceps



Suction Tube

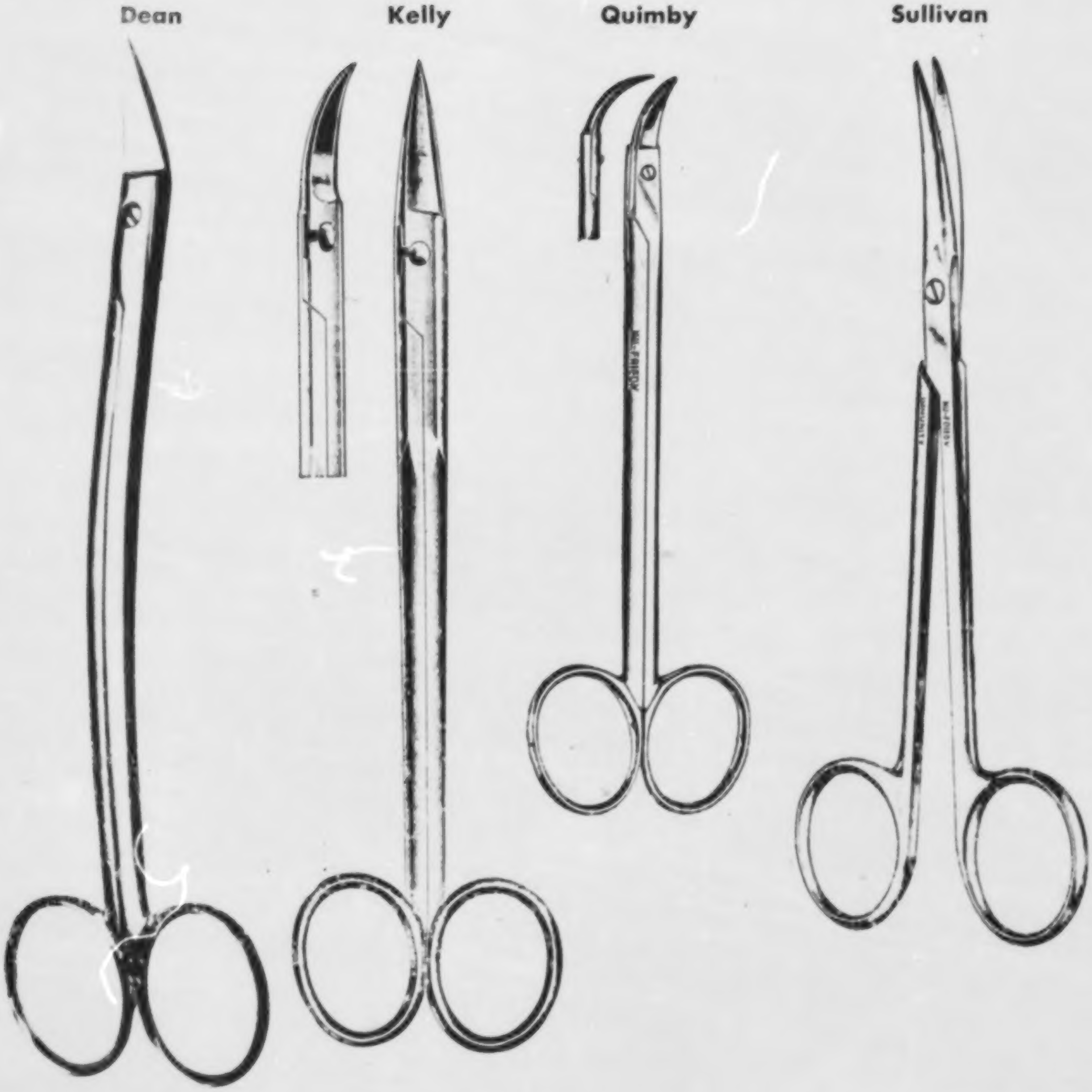


Aspirator Tip

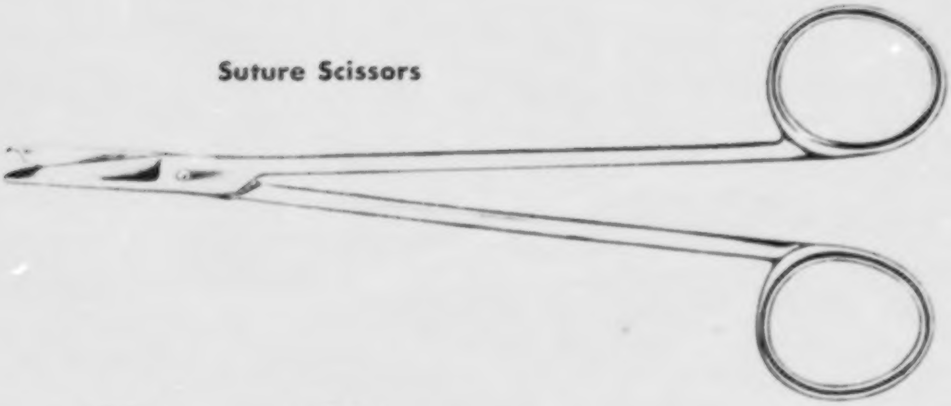


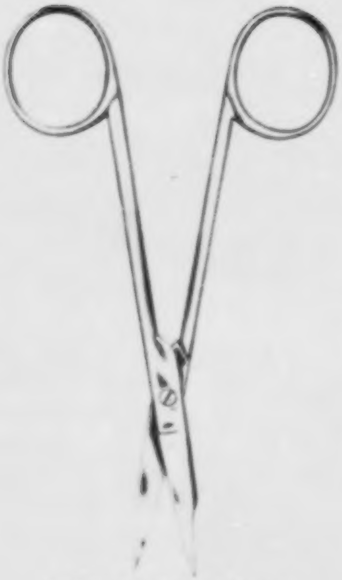
Suction Tips
Interchangeable

Surgical Scissors


Dean
Kelly
Quimby
Sullivan

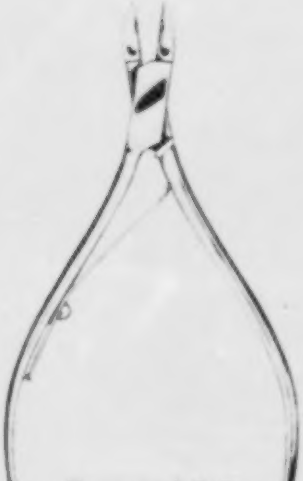
Suture Scissors





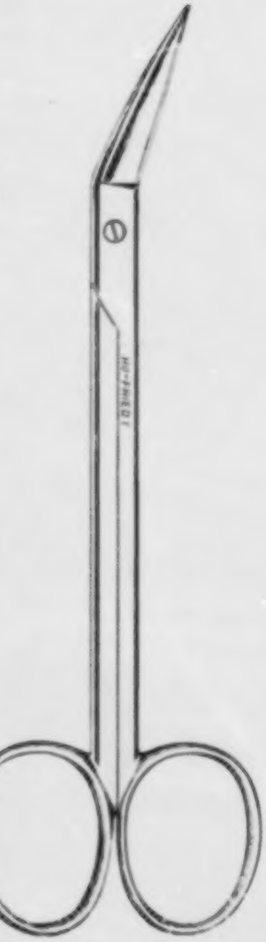
Goldman-Fox Scissors

are specifically designed for cutting small sections of tissue without tearing or pulling. Their beaks are purposely small for use in the interproximal area.

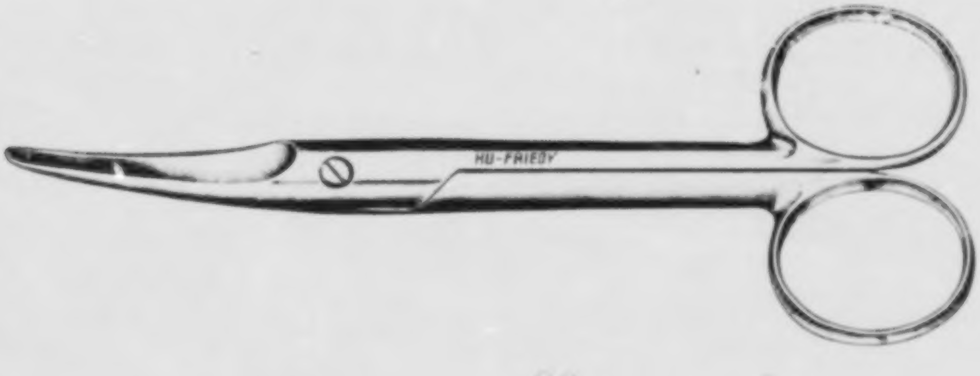


Bone and Soft Tissue Nippers

have small rongeur blades. They are perfect for all operative periodonic procedures — gingivoplasty, gingivectomy and osteoplasty—where tissue contour is needed.

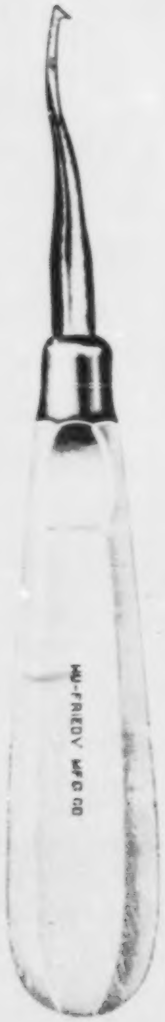


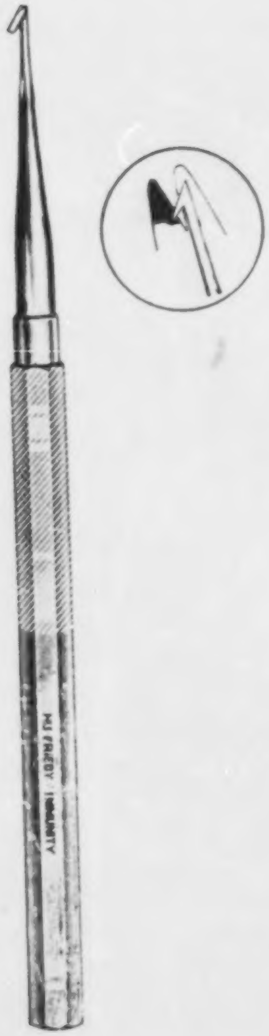
For cutting tissue at the interproximal area; also for use as a suture scissors.



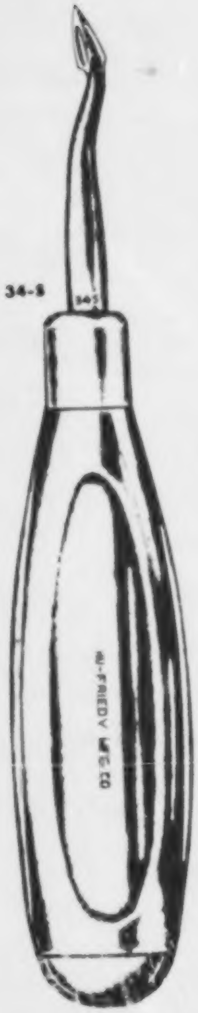
Apical Picks

Hook-ended instruments used to remove root tips in proximity to a nasal sinus or cavity.

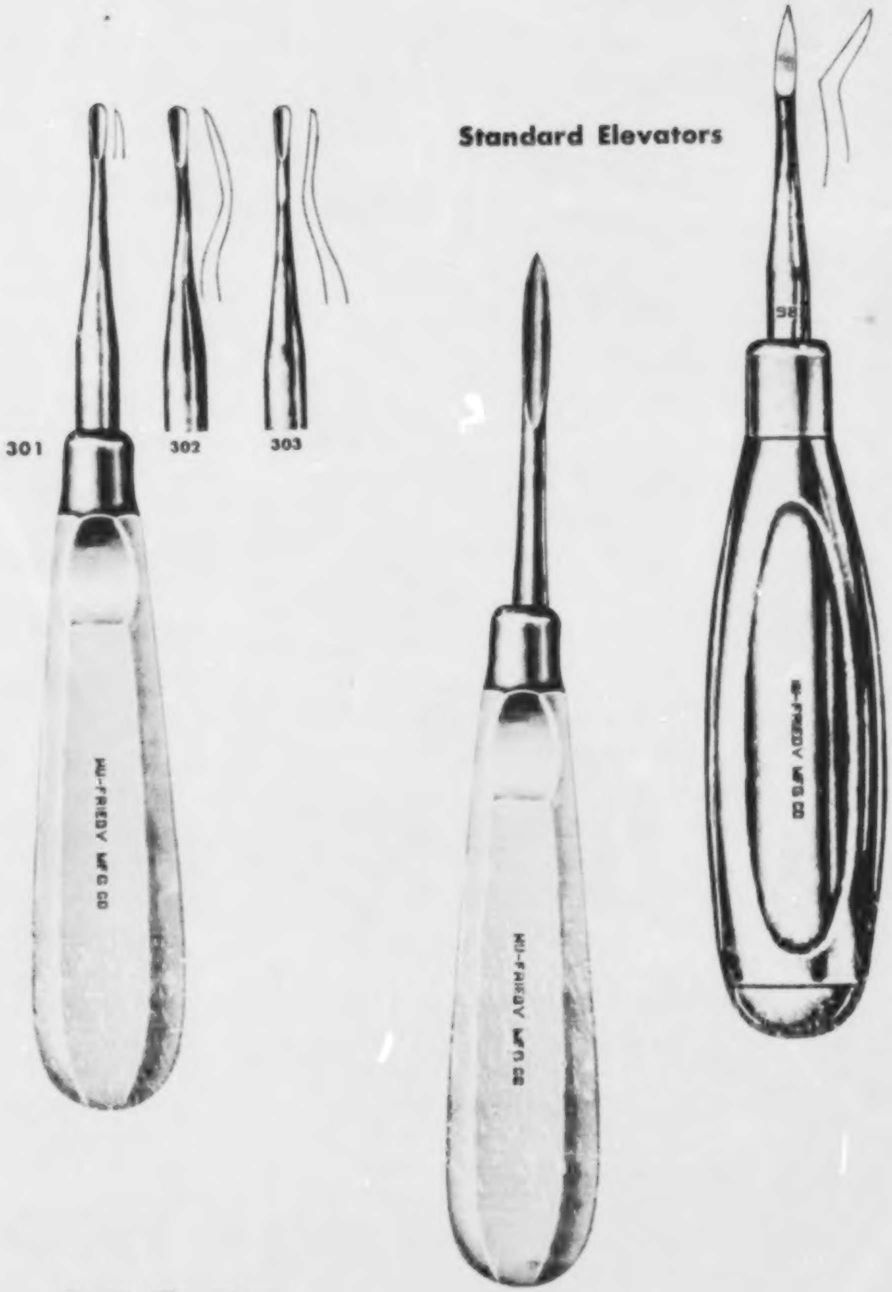

HU-FRIEDY MFG CO



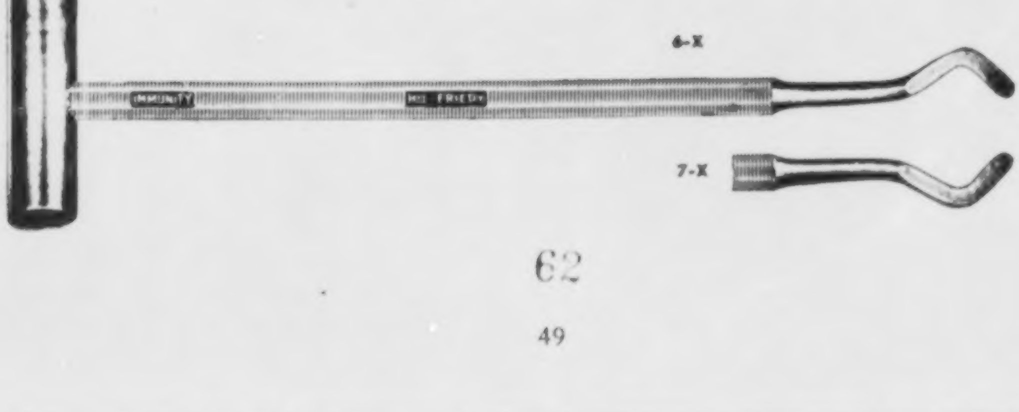
Standard Elevators


34-S
34S
HU-FRIEDY MFG CO

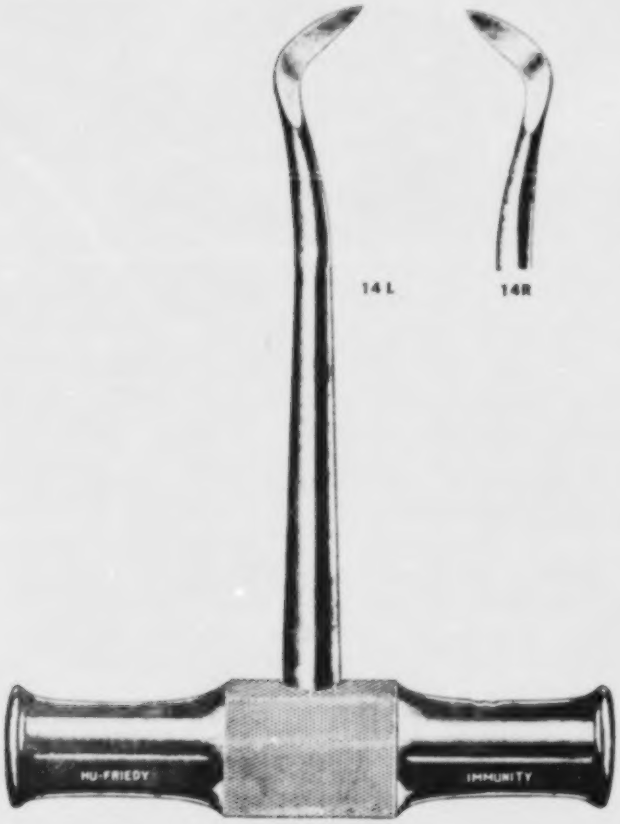
Brown Elevator

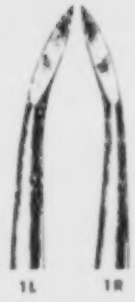

301
302
303
HU-FRIEDY MFG CO
HU-FRIEDY MFG CO
98
HU-FRIEDY MFG CO

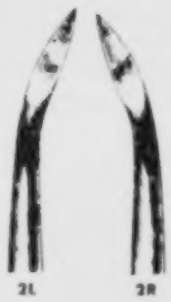
Pott's Elevators

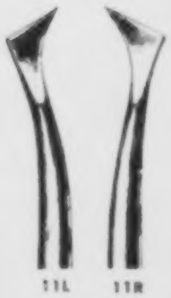

6-X
7-X
IMMUNITY
HU-FRIEDY

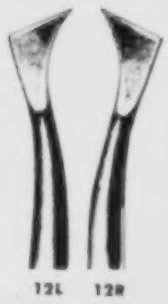
Cross Bar Elevators


14 L
14R
HU-FRIEDY
IMMUNITY



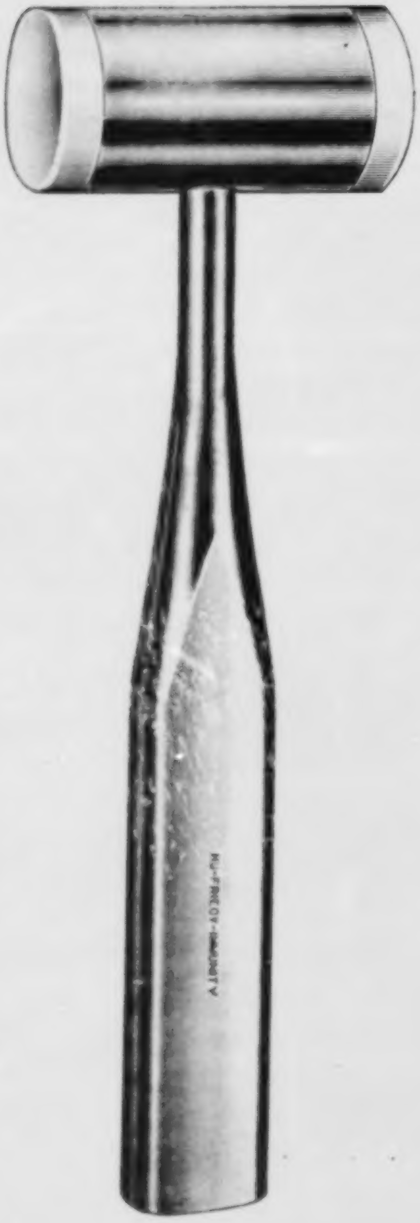






Surgical Mallets

The oral surgical hand mallet is a double-headed mallet resembling a gavel or wood mallet. This is used with certain bone chisels in chipping bone or the alveolar process when indicated in certain oral surgery cases.



With Removable Faces

Chromium Plated

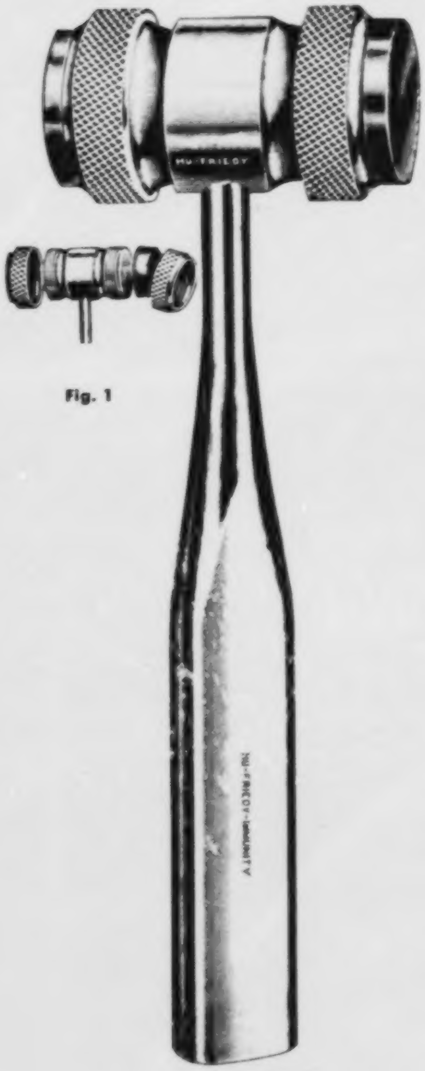
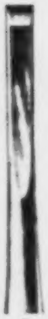


Fig. 1

64

Bone Chisels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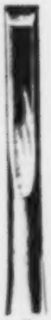
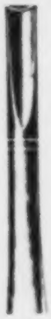

3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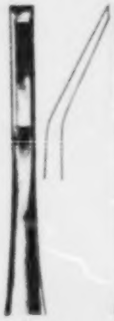
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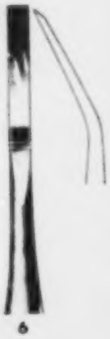
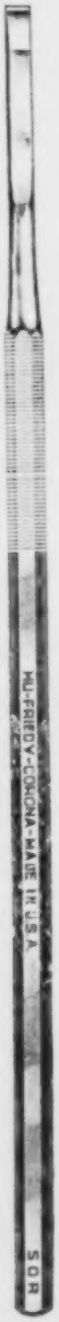
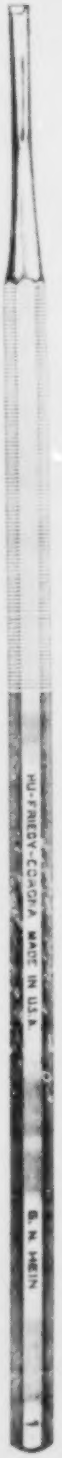

6

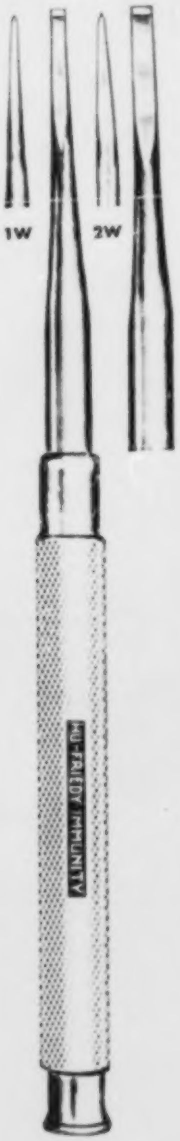
It has been established by scientific research with various methods of bone cutting that a chisel and a mallet are more efficient for cutting bone in the mouth than any other means.

The force of the blows of the mallet can readily be controlled, and the operator can gauge the depth to which the cutting edge of the chisel penetrates even the hardest of bone.

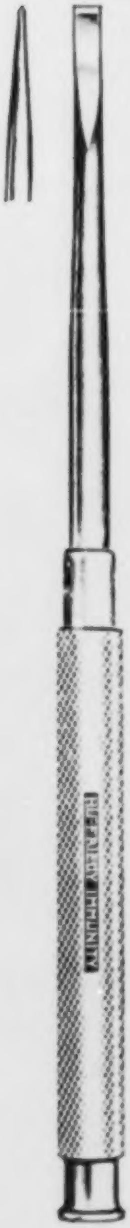

HU-FRIEDY-CORONA-MADE IN U.S.A.
SOR
2


HU-FRIEDY-CORONA MADE IN U.S.A.
G.N. HEIN
1
1

Double Bevel

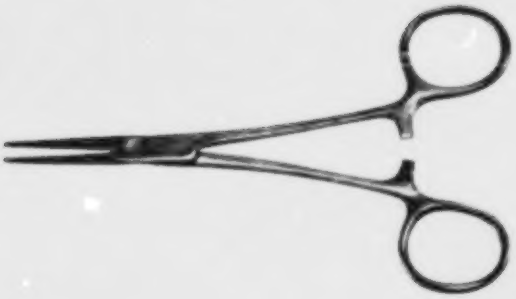

HU-FRIEDY IMMUNITY
1W

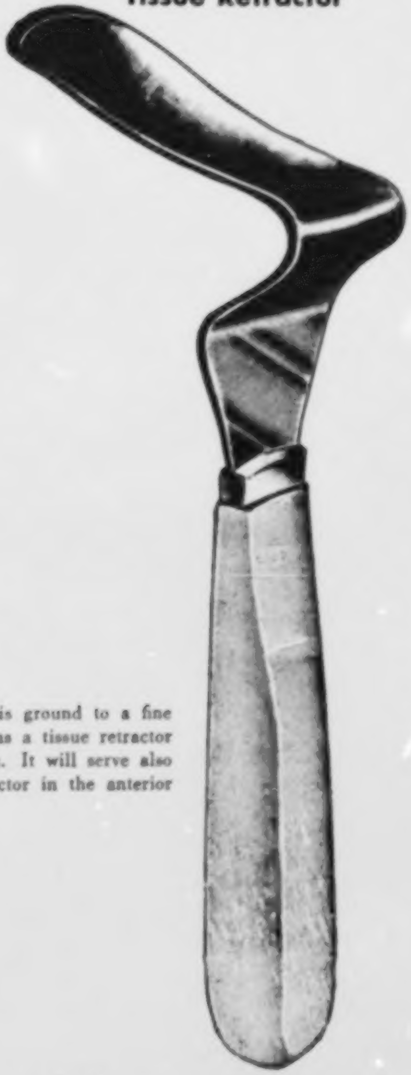
2W


HU-FRIEDY IMMUNITY
18

Black Cheek and Third Molar Tissue Retractor

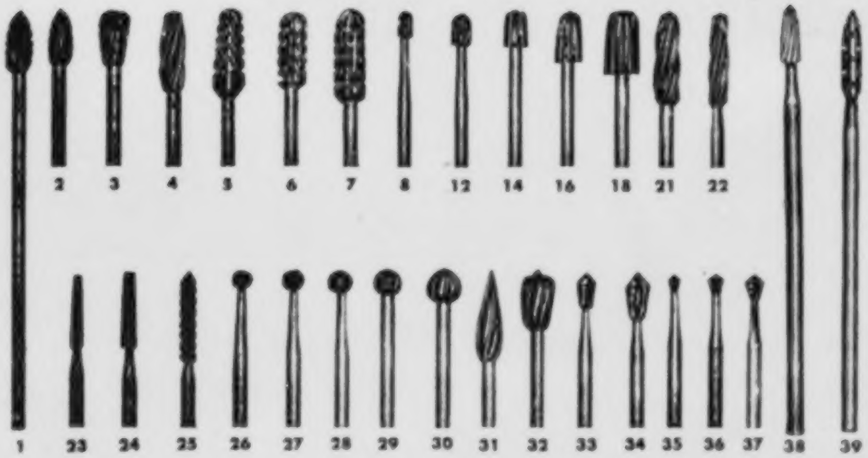
Kelly Haemostat





The end of the blade is ground to a fine burnished edge to serve as a tissue retractor in the third molar region. It will serve also as a lip and tissue retractor in the anterior portion of the mouth.

Surgical Bone Burs


2
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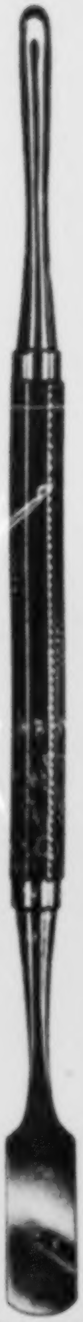
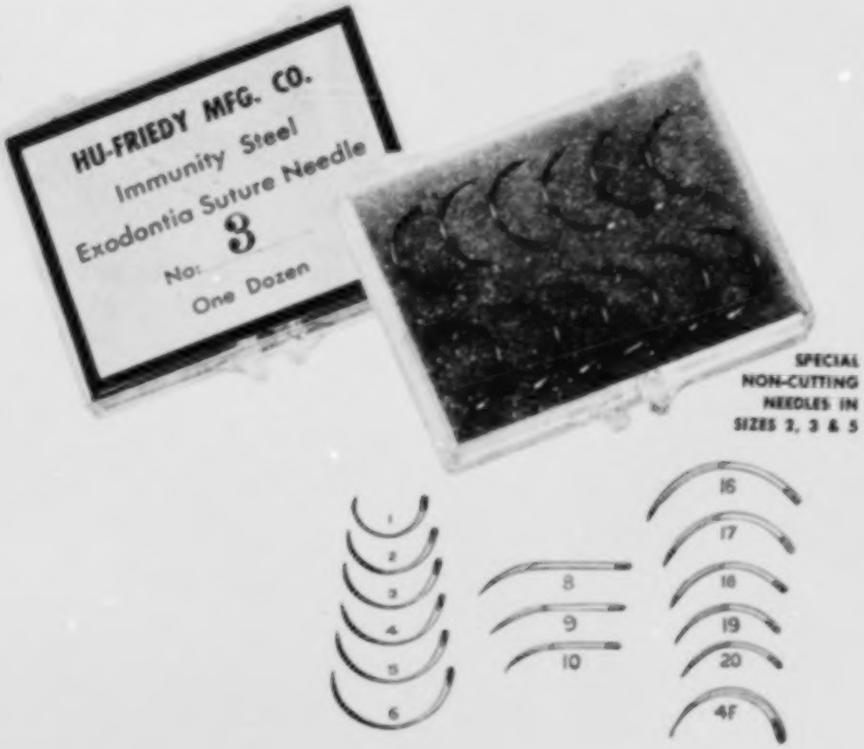


Periosteal and Retractor

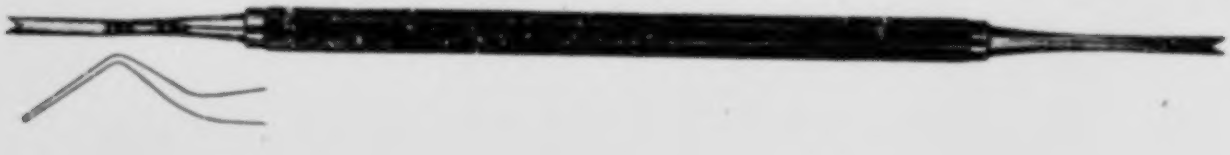
Non-Tarnish Surgical Needles

Authentic Needles for Oral Surgery


HU-FRIEDY MFG. CO.
Immunity Steel
Exodontia Suture Needle
3
No:
One Dozen
1
2
3
4
5
6
8
9
10
16
17
18
19
20
4F

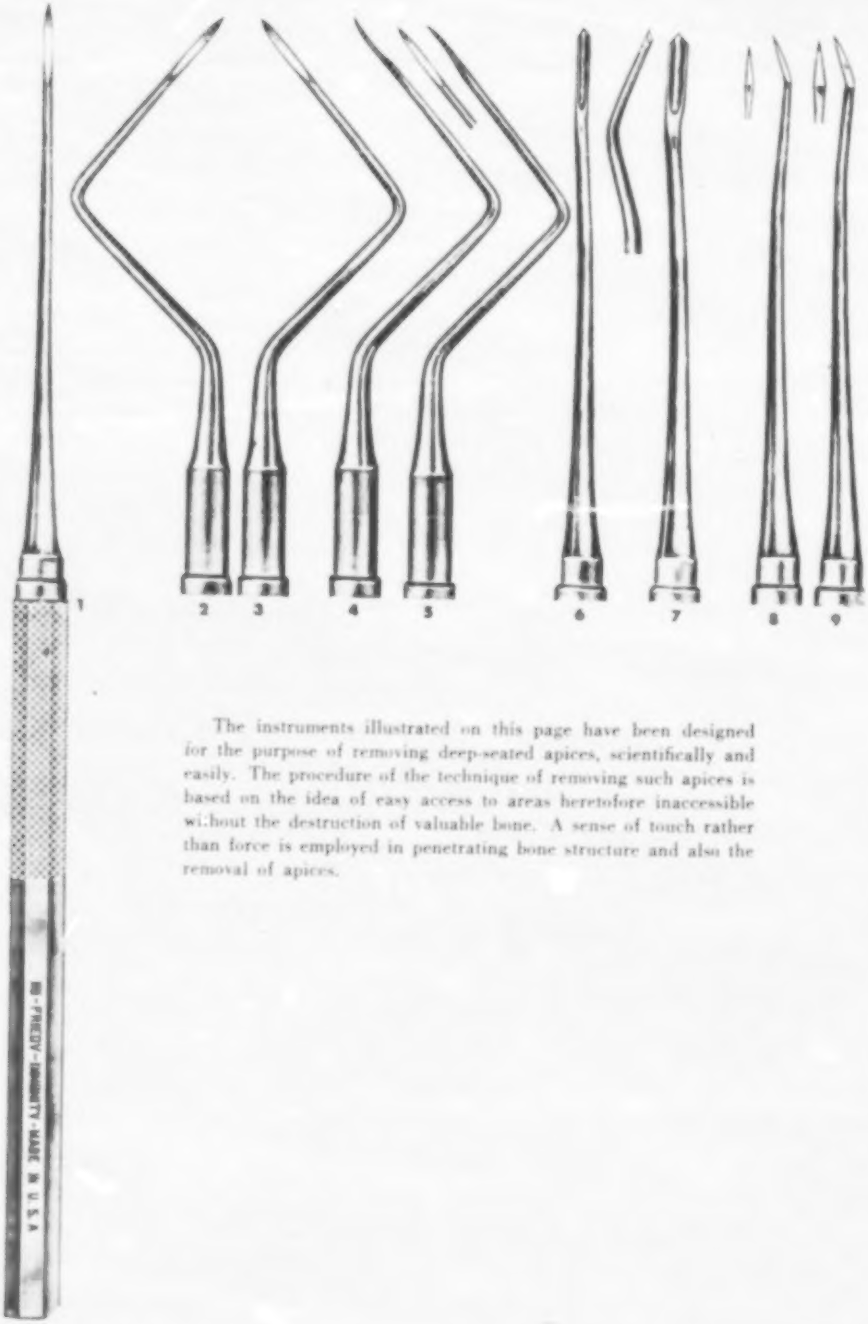
SPECIAL
NON-CUTTING
NEEDLES IN
SIZES 2, 3 & 5

Gauze Packer



Root-Tip Teasers (Picks)

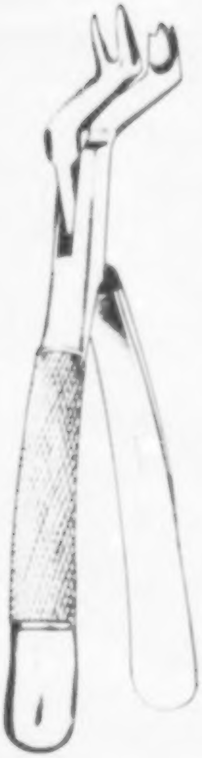
This instrument is an elevator (in miniature.) Used to remove root tips, fragments, or fractured roots at the apical third portion. Sometimes root-tip picks are referred to as apical fragment ejectors.

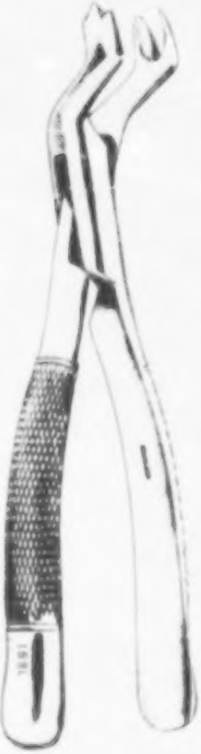


The instruments illustrated on this page have been designed for the purpose of removing deep-seated apices, scientifically and easily. The procedure of the technique of removing such apices is based on the idea of easy access to areas heretofore inaccessible without the destruction of valuable bone. A sense of touch rather than force is employed in penetrating bone structure and also the removal of apices.

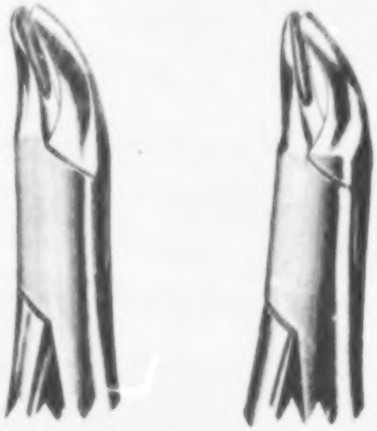
Maxillary First- and Second-Molar Forceps

The illustrations below show several different types of extraction forceps.



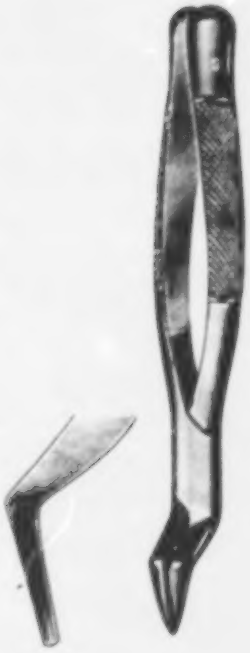


Universal Upper



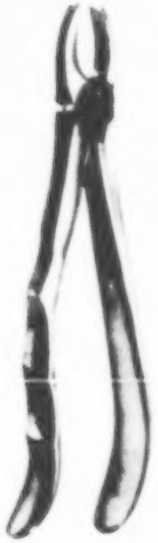
Bayonet Forceps

Extraction of the upper premolars, upper anteriors, and roots. Beaks are forced beneath the loosened soft tissue and are closed firmly on the cementum covering the tooth neck. This shape permits parallel application of the beaks to the tooth root, and the handles avoid pinching the lip during pressure applied during the extraction process. Also an excellent forceps for removal of deciduous anterior maxillary teeth.

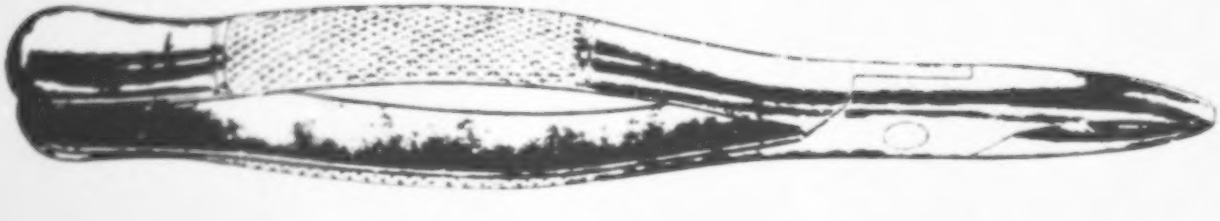


Maxillary Anterior Forceps

Used to extract maxillary anteriors. Forceps are distinguished by the angles of the beaks, the notches of the beaks, the contour and the number engraved on the forceps handle.



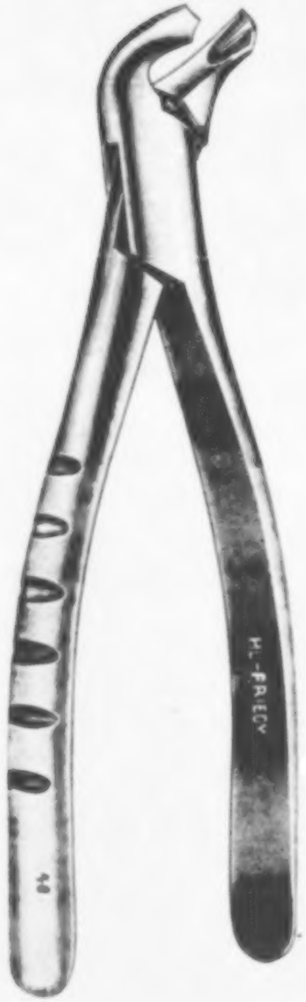
Upper Centrals
and Cuspids



Universal Mandibular Molar Forceps (Cowhorns)

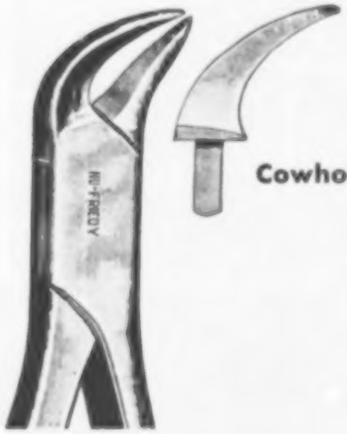
These forceps are the choice for extraction of lower molars whose roots are not fused. The best application is for teeth without full crowns or for molars with badly broken down crowns. Care must be taken when using the "cowhorns" forceps to guard against aspiration or swallowing of lower molars, which sometimes pop out with considerable speed.

Note: The term "universal," when associated with a forceps, means the forceps are designed for extraction of teeth in the right and left sides of the same arch, but *not* for extracting teeth in the opposite arch.



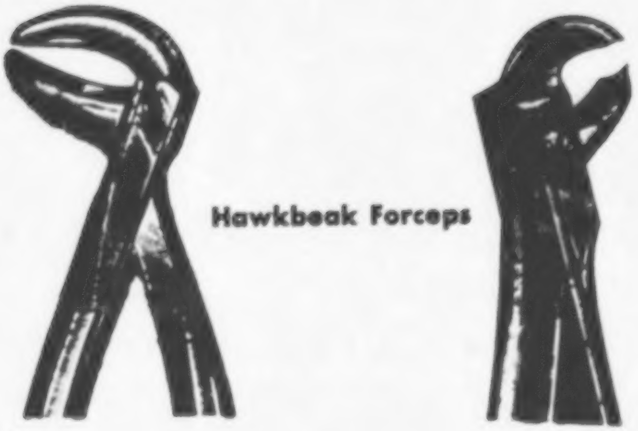
Lower Molar

Lower Molar Forceps



Mandibular Forceps (Parrot or Hawkbeaks)

This forceps has a hawk-bill shape. It has also been nicknamed parrot, from the design of the jaws.



Hawkbeak Forceps

Laboratory Exercise – Oral Surgical Instruments

Name ______________________________ Date __________

1. Describe the difference between ligature and suture:

____

____

____

List 10 instruments which one could find on an uncomplicated extraction tray setup:

2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________

Introduction:

Anatomy is the study of the structure of a living organism. Physiology is the study of the functioning of the organism, as a whole and in its parts. Anatomic reference systems have been developed in order to facilitate descriptions of the parts of the body. The four basic reference systems are: *planes, directions, cavities,* and *structural units.*

Objectives:

1. Define anatomy and physiology.
2. List four anatomical landmark planes and explain each.
3. Given a diagram of anatomical planes, identify each.
4. Given a list of anatomic reference directions, correctly define each and locate on a diagram.
5. Given a diagram of body cavities, identify each and give its components.
6. Define the anatomical structural units: cells, tissues, organs, and systems.
7. List the nine body systems and give components of each.
8. Given a diagram of tissue, identify each according to structure and state where it can be found within the human body.
9. Given certain anatomical structures from a dissected manikin, correctly identify the organ as well as the body cavity it is contained in.

Equipment:

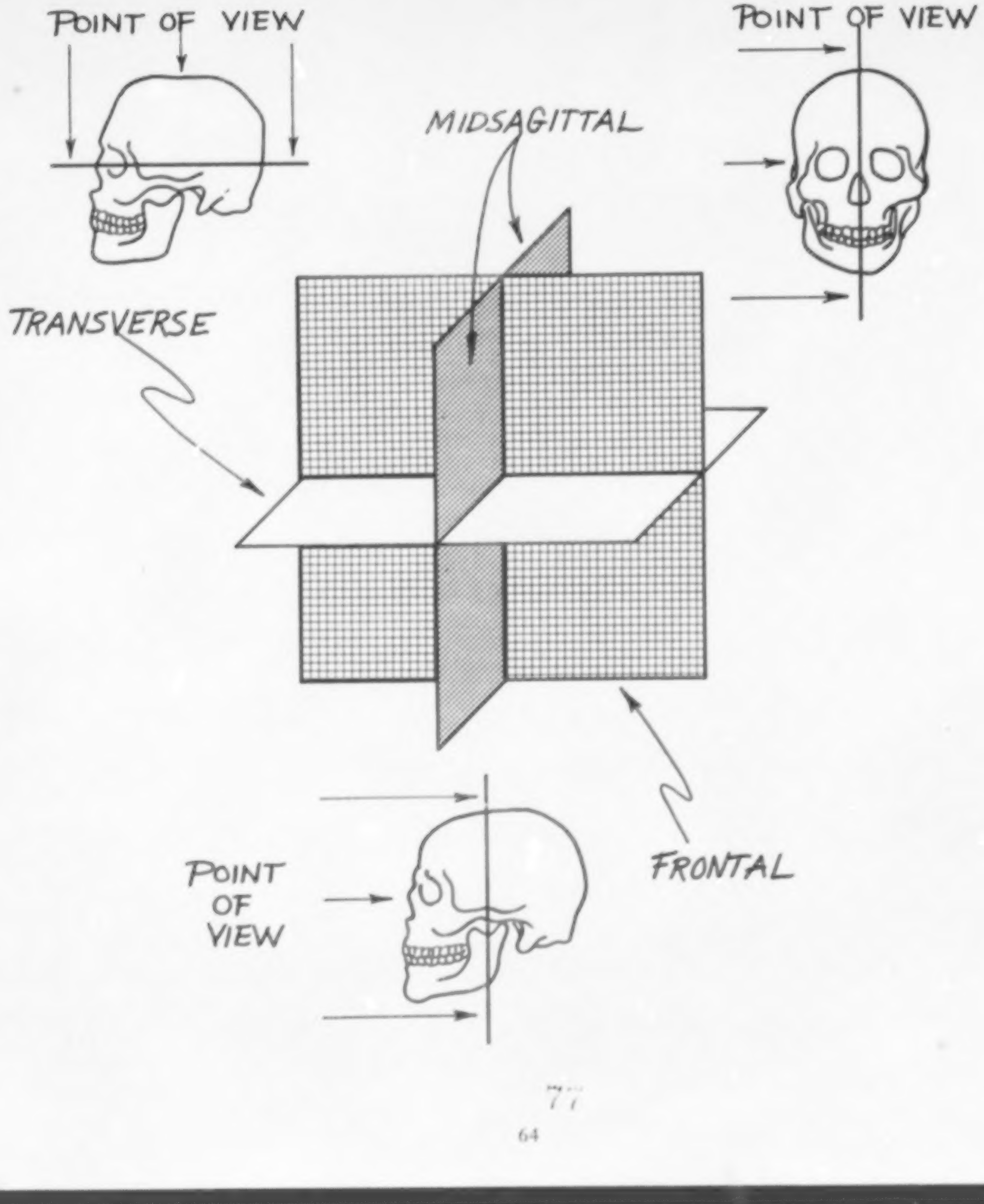
Standing manikin with removable parts
Anatomical texts
Skulls
Human skeleton

Anatomic Reference System

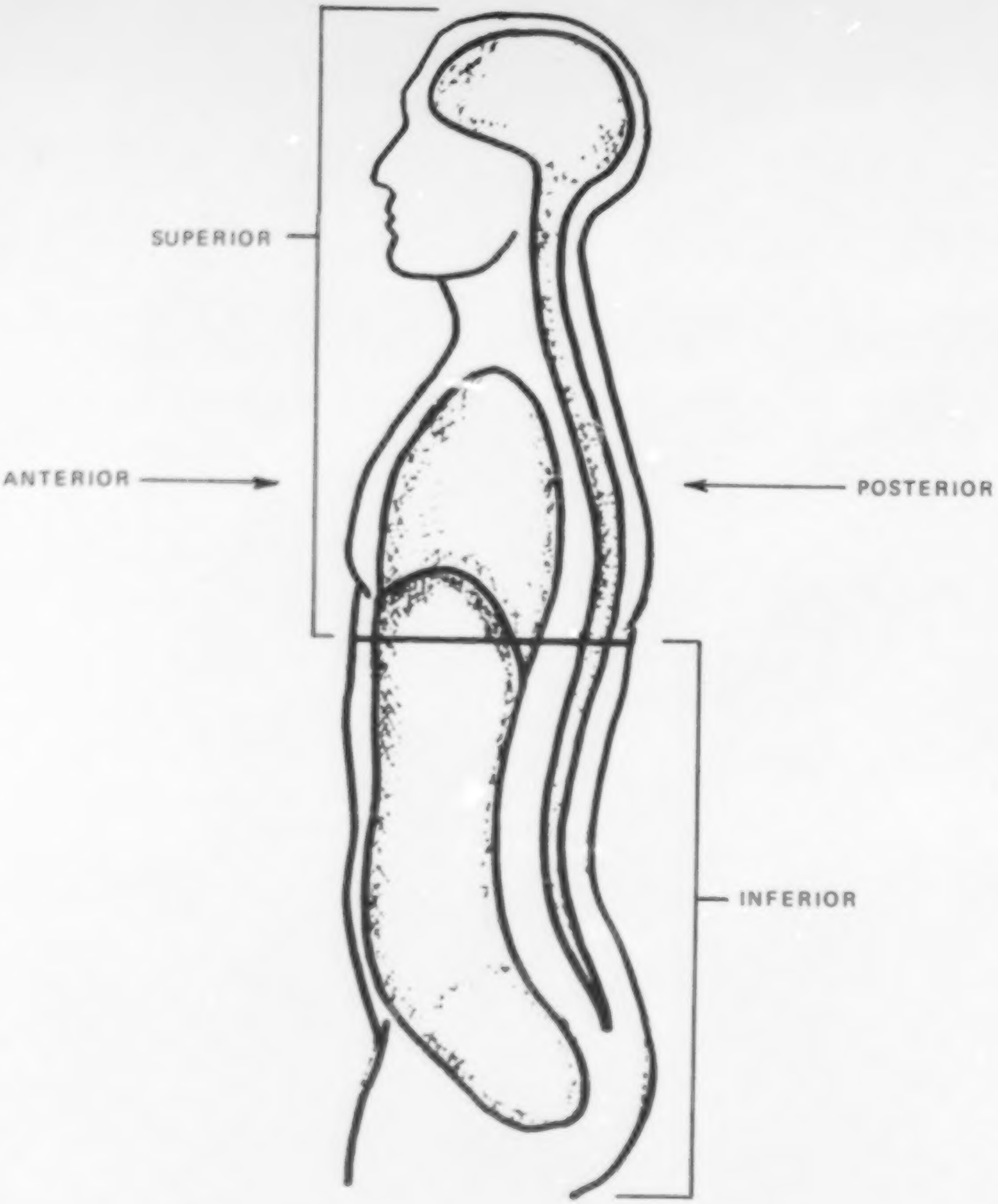
Planes	Explanation
Midsagittal (midline)	The plane vertically dividing the body through the midline into right and left halves.
Sagittal	Any vertical plane dividing the body into left and right portions, not necessarily at the midline but parallel to it.
Frontal (coronal)	Vertical but at right angles to sagittal sections, dividing the body into anterior and posterior sections.
Transverse	Horizontal, hence at right angles to both sagittal and frontal sections, dividing the body into upper and lower portions.

Directions	Explanation
Anterior	Toward the front
Posterior	Toward the back
Superior	Uppermost or above
Inferior	Lowermost or below
Medial	Toward the midline
Lateral	Toward the side
Distal	Away from the source or attachment

BODY PLANES


POINT OF VIEW
POINT OF VIEW
MIDSAGITTAL
TRANSVERSE
POINT OF VIEW
FRONTAL

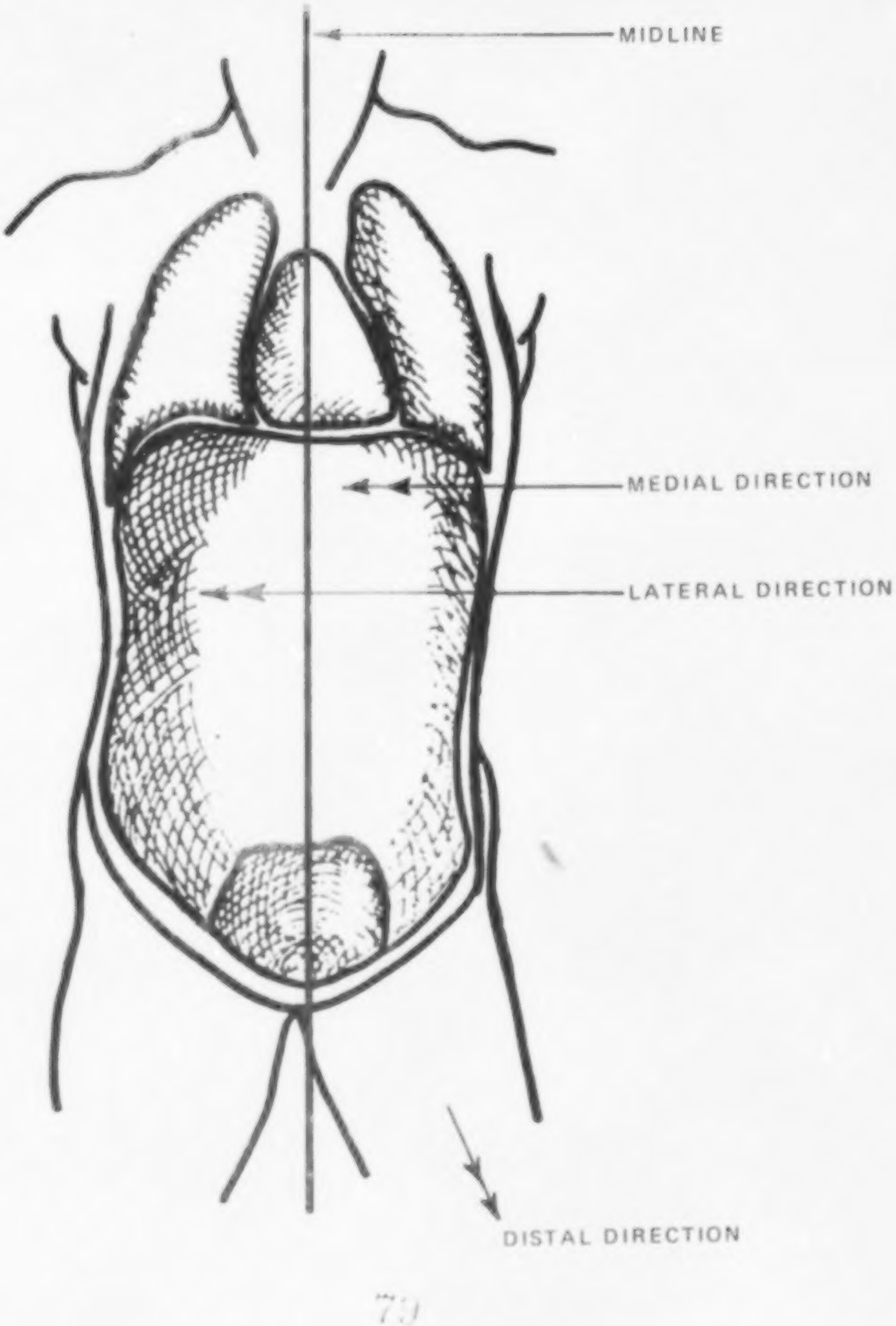
ANATOMICAL DIRECTIONS


SUPERIOR
ANTERIOR
POSTERIOR
INFERIOR

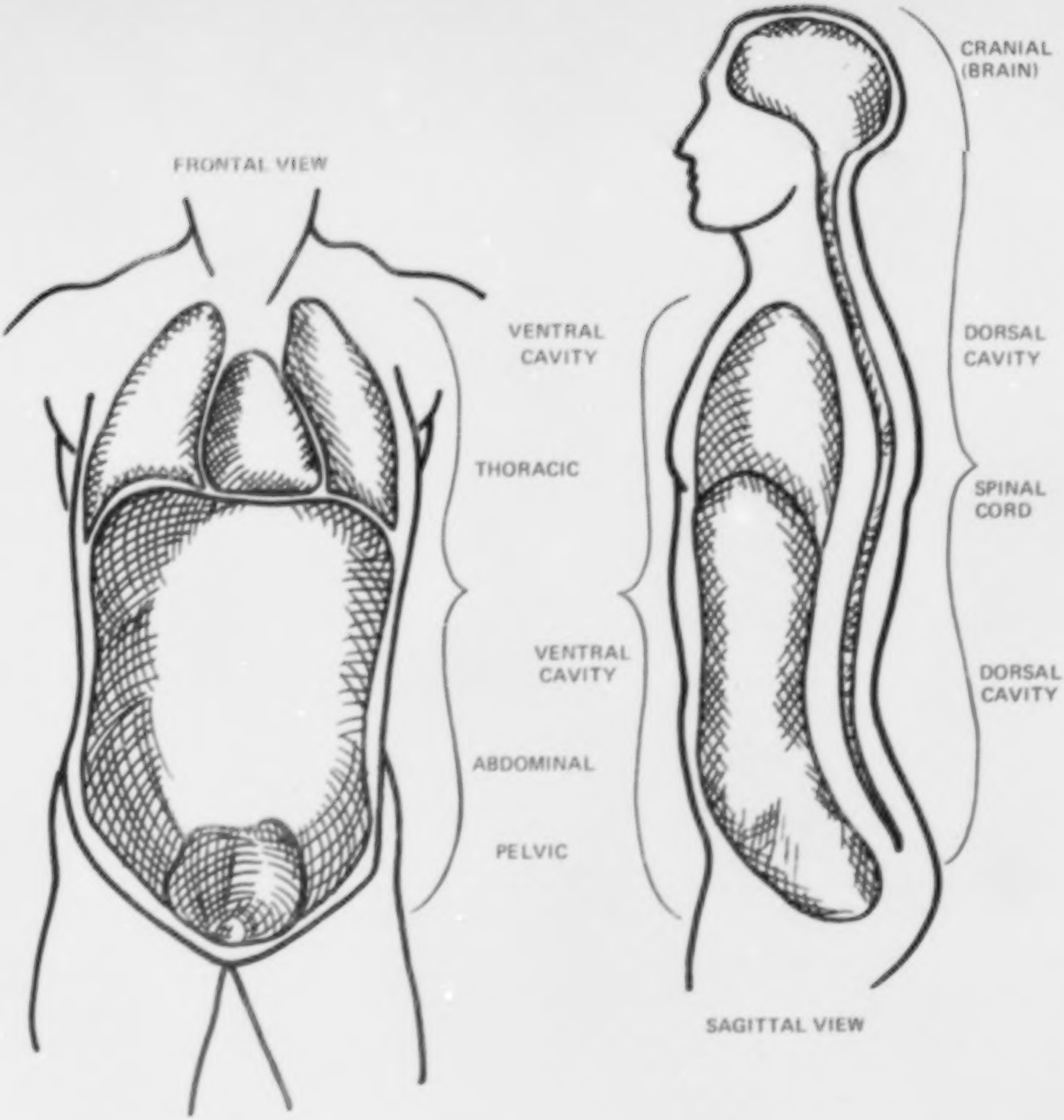
SAGITTAL VIEW

ANATOMICAL DIRECTIONS

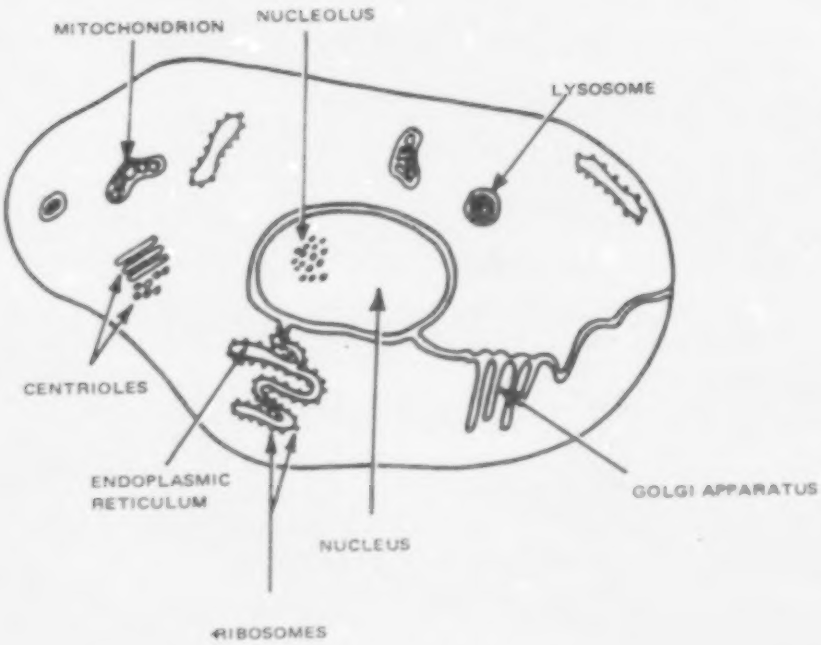
FRONTAL VIEW


MIDLINE
MEDIAL DIRECTION
LATERAL DIRECTION
DISTAL DIRECTION

Body Cavities	Explanation
Dorsal	Contains structures of the nervous system serving to coordinate the body's functions in a unified manner.
a. Cranial	Contains the brain.
b. Spinal	Contains the spinal cord.
Ventral	Contains the organs involved in maintaining *homeostasis* (a tendency to stability in an organ).
a. Thoracic	Contains the lungs and heart.
b. Abdominal	Contains the major organs of digestion.
c. Pelvic	Contains the major organs of reproduction and excretion.


FRONTAL VIEW
VENTRAL CAVITY
THORACIC
VENTRAL CAVITY
ABDOMINAL
PELVIC
CRANIAL (BRAIN)
DORSAL CAVITY
SPINAL CORD
DORSAL CAVITY
SAGITTAL VIEW

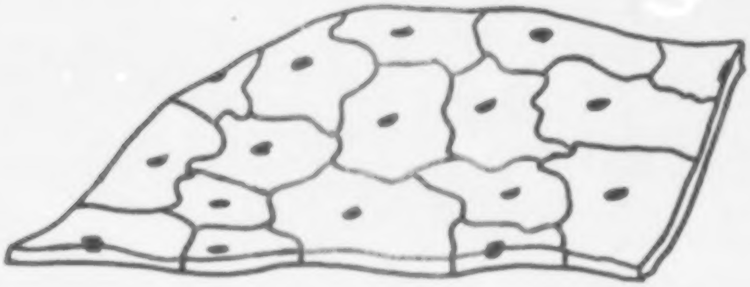
Structural Units	Explanation
Cell	Cells are the basic physiological and structural units of the body. Some components of cells include cell membrane, cytoplasm, nucleus, and nucleolus. For further information on function and importance of these components, check additional references.


MITOCHONDRION
NUCLEOLUS
LYSOSOME
CENTRIOLES
ENDOPLASMIC RETICULUM
GOLGI APPARATUS
NUCLEUS
RIBOSOMES

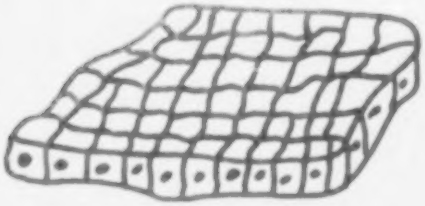
A CELL

Structural Units	Explanation
Tissue	The basic unit of tissue is the cell. Generally tissues contain cells similar in appearance, function, and embryonic origin. Tissue is divided into four categories:
1. Epithelial	Acts as a covering (e.g., skin) or lining of a system (e.g., mucous membrane of the digestive system).

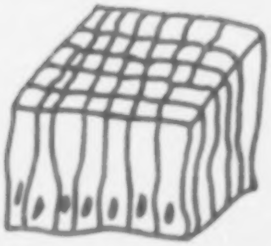
Simple Squamous Epithelium



Simple Cuboidal Epithelium



Simple Columnar Epithelium



The illustrations of various epithelial tissue include only three types. Research the remaining three types, either with the use of reference textbooks or mounted microscope slides (available in the laboratory), and complete your own drawings:

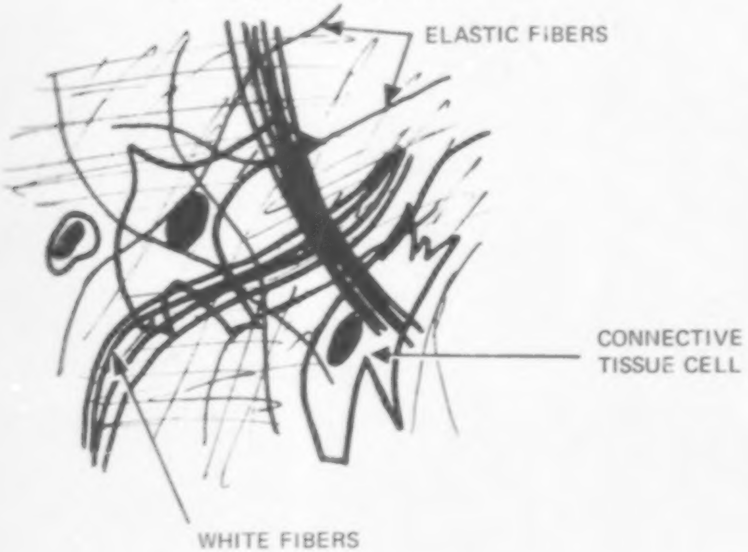
Pseudostratified Columnar Ciliated Epithelium

Transitional Epithelium

Stratified Squamous Epithelium

2. Connective Supports, protects, and binds other tissues together.

Ordinary Loose Connective Tissue


ELASTIC FIBERS
CONNECTIVE TISSUE CELL
WHITE FIBERS

The illustration above shows only one type of connective tissue. Through your own research produce the following three drawings:

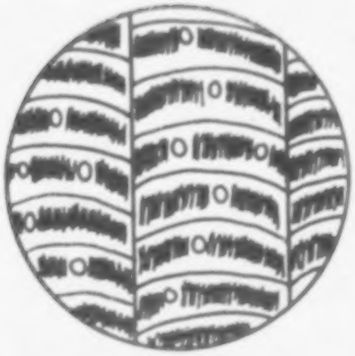
Dense Fibrous Connective Tissue

Cartilage Connective Tissue

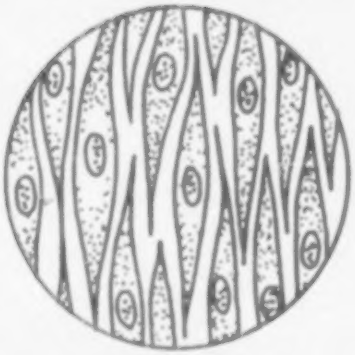
Adipose Connective Tissue

3. Muscle — Highly specialized to shorten or lengthen as contraction and relaxation take place.

Skeletal or Striated-Muscle Tissue



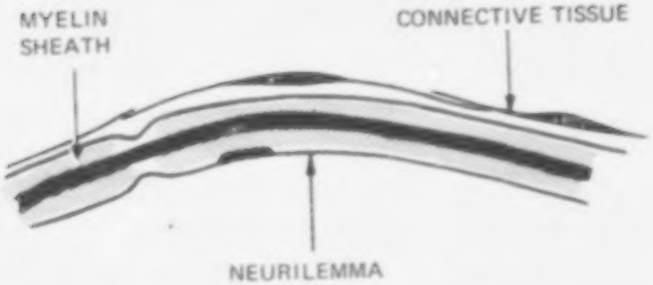
Visceral or Smooth-Muscle Tissue



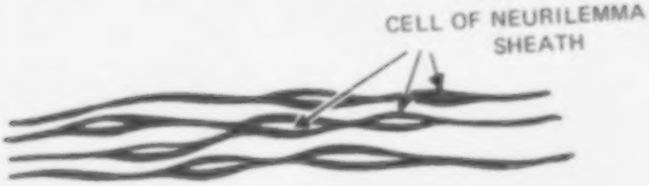
Make a drawing of **Cardiac Muscle Tissue**:

4. Nervous — Specialized cells which conduct impulses and receive stimuli from the body.

Myelinated Nervous Tissue


MYELIN SHEATH
CONNECTIVE TISSUE
NEURILEMMA

Unmyelinated Nervous Tissue

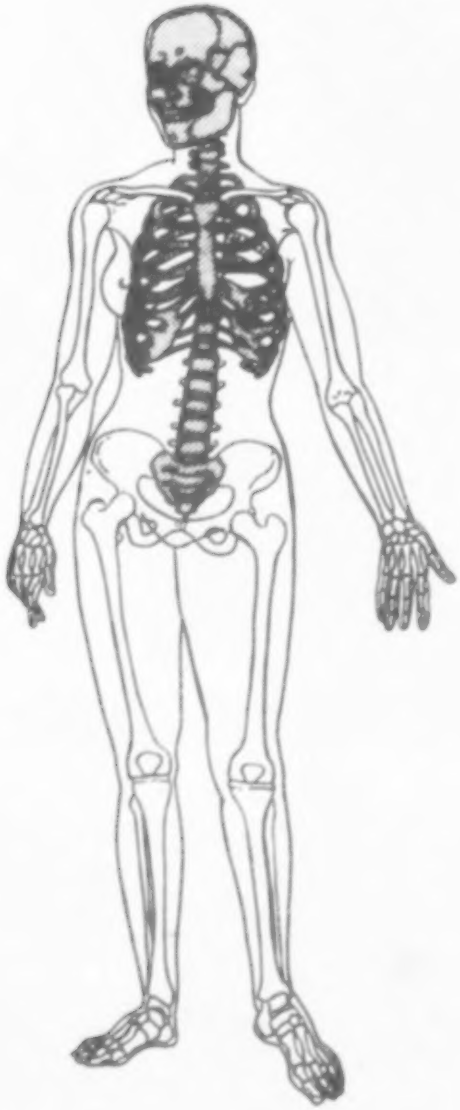

CELL OF NEURILEMMA SHEATH

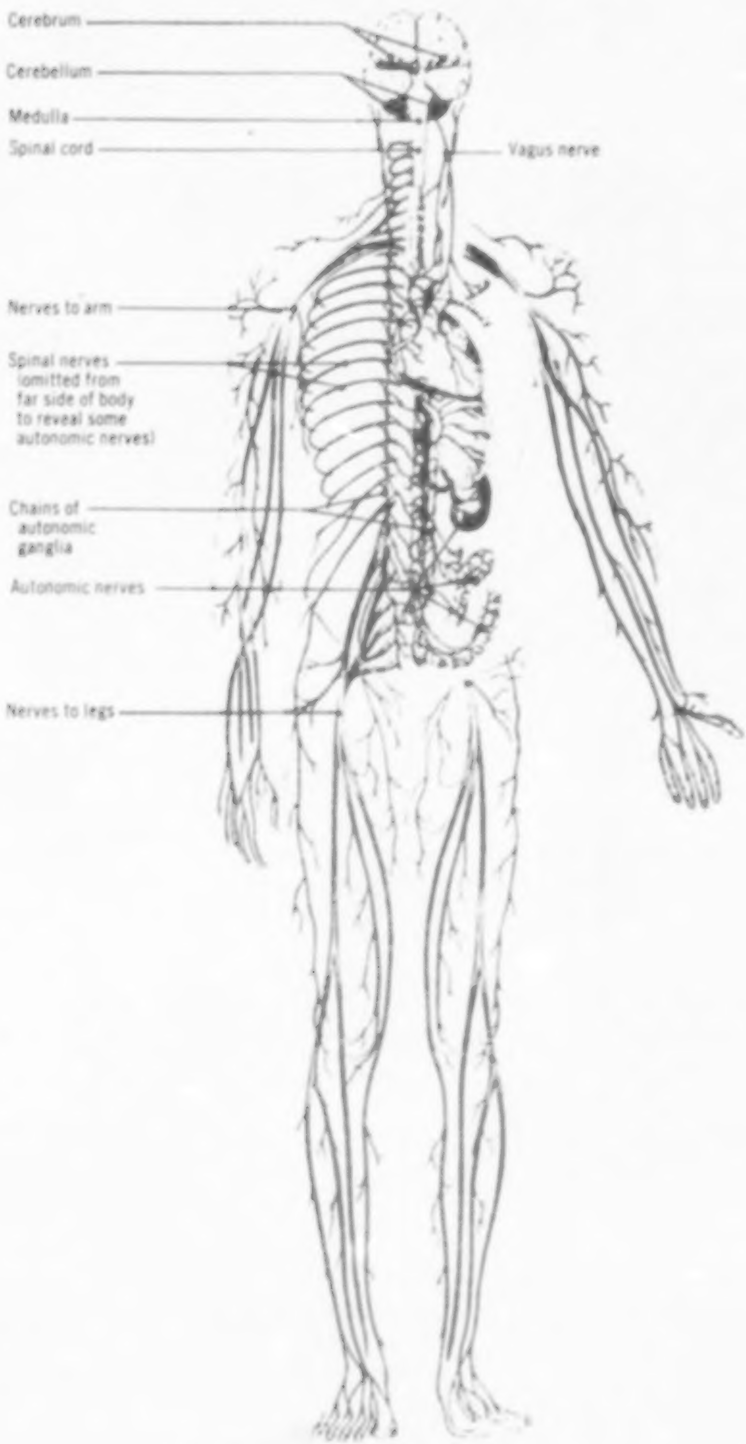
Structural Units	Explanation
Organ	An organ is composed of cells grouped into tissues serving a common function.
System	Organs are grouped into systems. There are nine major body systems.
1. Skeletal system	There are 206 bones in the human body. (Bones of head and neck will be covered separately.)
2. Muscular system	There are over 600 muscles in the human body. (Muscles of the head and neck will be covered separately.)
3. Nervous system	(Nerves of the head and neck will be covered separately.)
4. Digestive system	
5. Reproductive system	
6. Excretory system	
7. Endocrine system	
8. Circulatory system	
9. Respiratory system	

Major Divisions of the Human Skeleton

The *axial* skeleton consists of the skull, spinal column, ribs, and the sternum (80 bones). It is shown shaded in the drawing below.

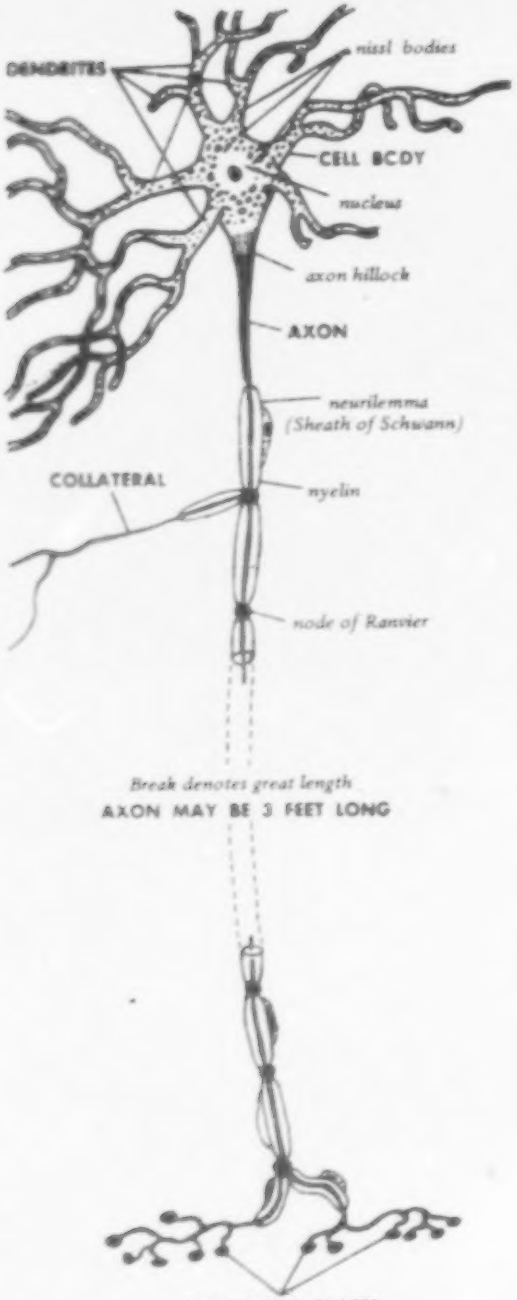
The *appendicular* skeleton consists of the upper extremities and shoulder girdle and the lower extremities (126 bones). It is shown unshaded in the drawing below.



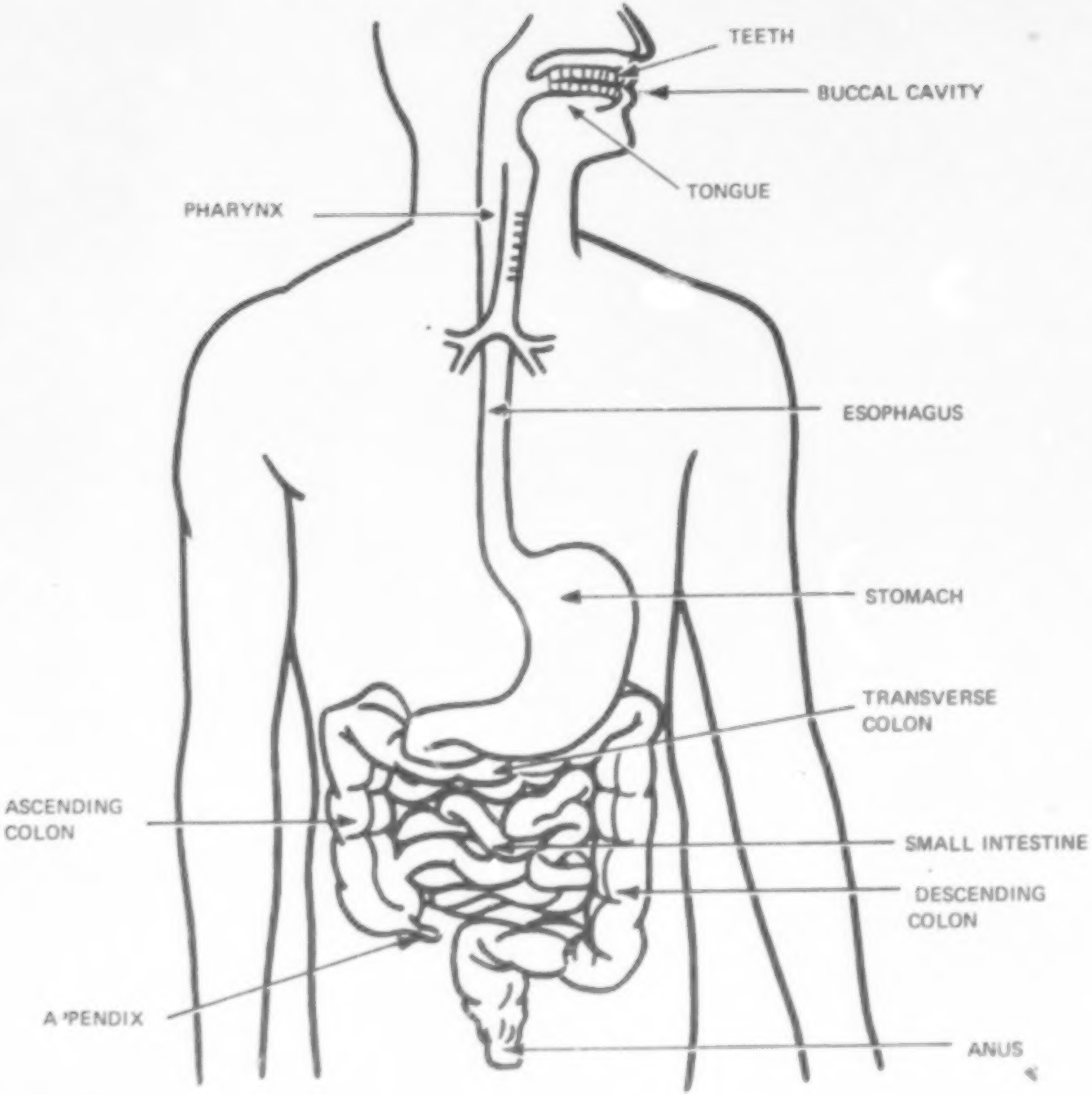

Cerebrum
Cerebellum
Medulla
Spinal cord
Vagus nerve
Nerves to arm
Spinal nerves (omitted from far side of body to reveal some autonomic nerves)
Chains of autonomic ganglia
Autonomic nerves
Nerves to legs

Components of the Nervous System

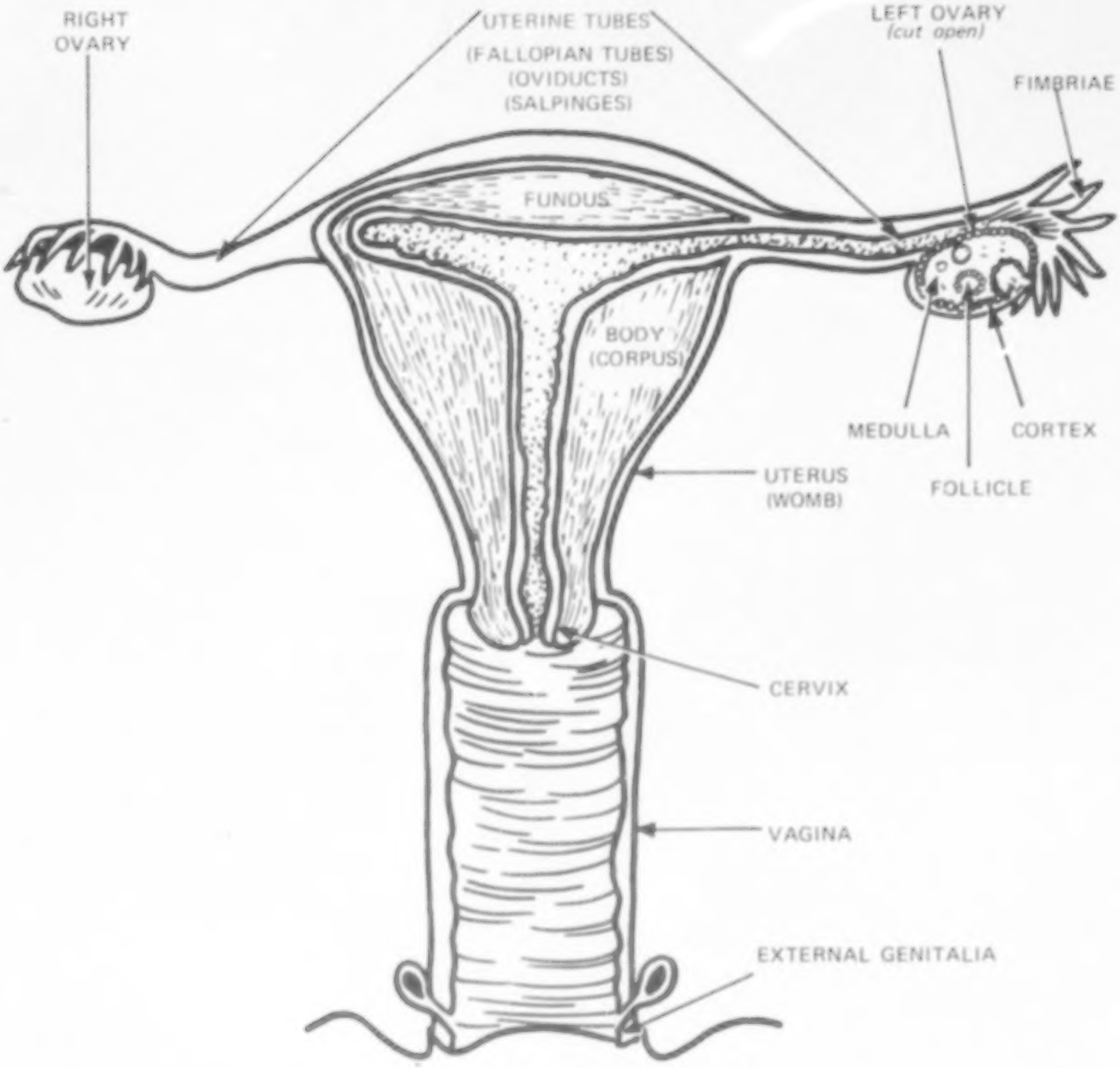
From: *Exploring Biology* by Ella Thea Smith, Harcourt, Brace and Company


DENDRITES
nissl bodies
CELL BODY
nucleus
axon hillock
AXON
neurilemma
(Sheath of Schwann)
COLLATERAL
myelin
node of Ranvier
Break denotes great length
AXON MAY BE 3 FEET LONG
MOTOR END PLATES
FUNCTIONAL ENDING OF AXON

A Neuron

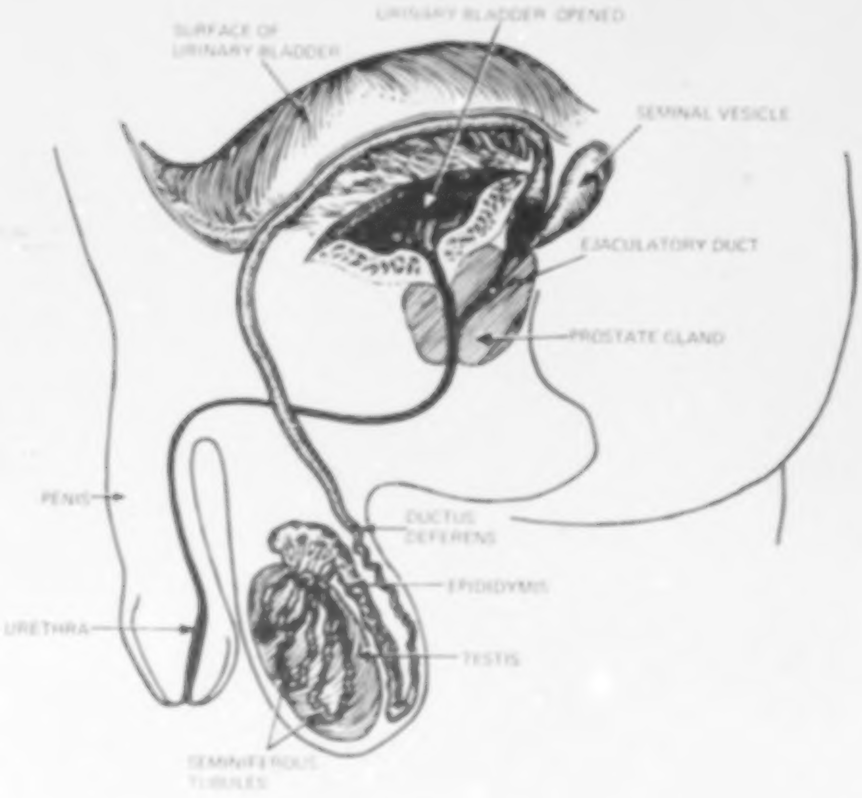

TEETH
BUCCAL CAVITY
TONGUE
PHARYNX
ESOPHAGUS
STOMACH
TRANSVERSE COLON
ASCENDING COLON
SMALL INTESTINE
DESCENDING COLON
APPENDIX
ANUS

The Digestive System

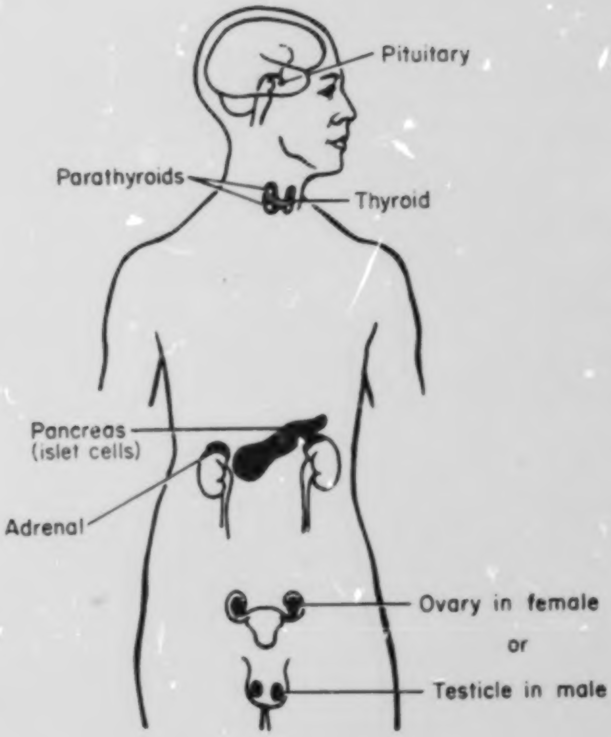

RIGHT OVARY
UTERINE TUBES
(FALLOPIAN TUBES)
(OVIDUCTS)
(SALPINGES)
LEFT OVARY
(cut open)
FIMBRIAE
FUNDUS
BODY
(CORPUS)
MEDULLA
CORTEX
FOLLICLE
UTERUS
(WOMB)
CERVIX
VAGINA
EXTERNAL GENITALIA

The Female Reproductive System

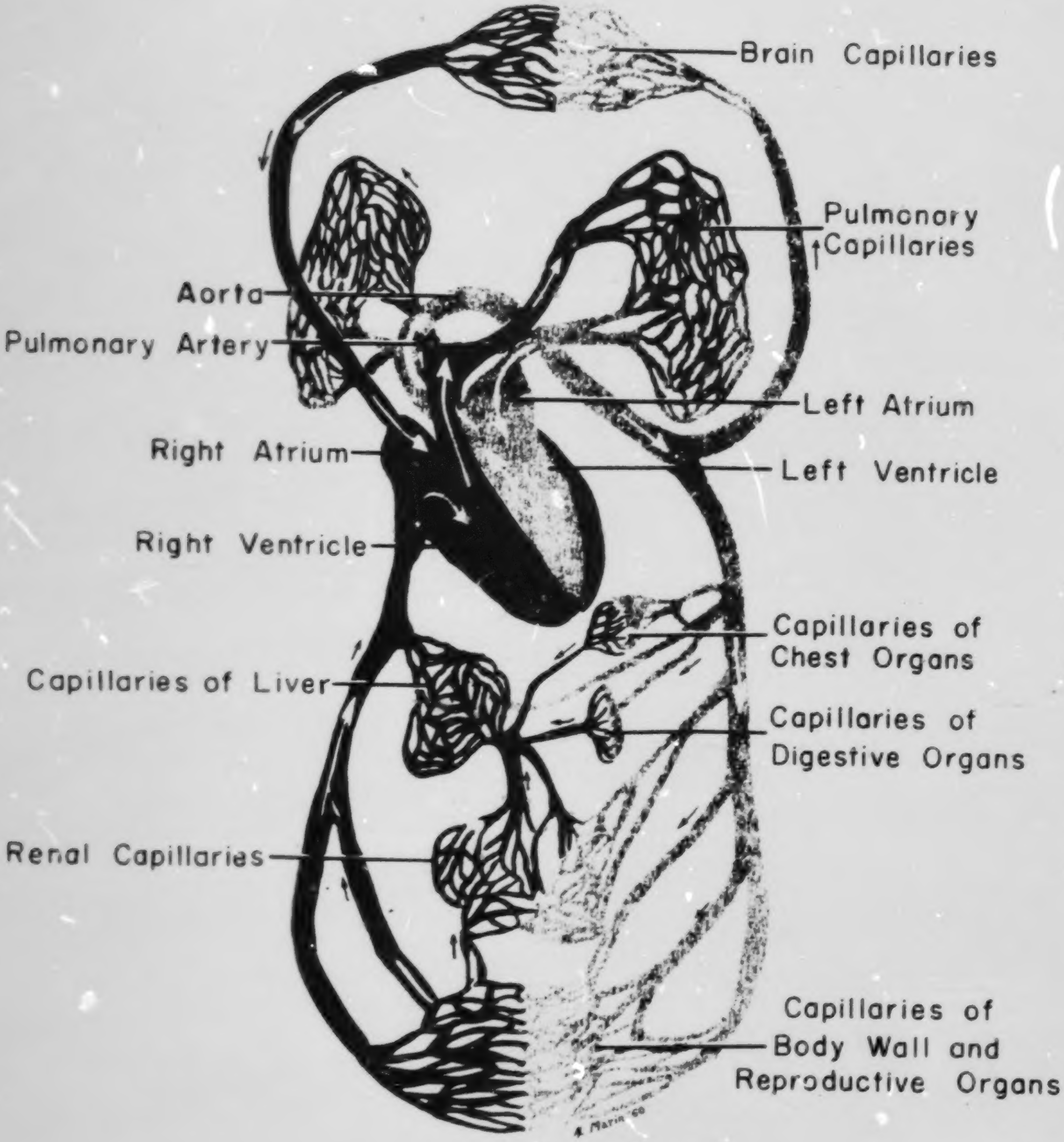
91


SURFACE OF
URINARY BLADDER
URINARY BLADDER OPENED
SEMINAL VESICLE
EJACULATORY DUCT
PROSTATE GLAND
PENIS
DUCTUS
DEFERENS
EPIDIDYMIS
URETHRA
TESTIS
SEMINIFEROUS
TUBULES

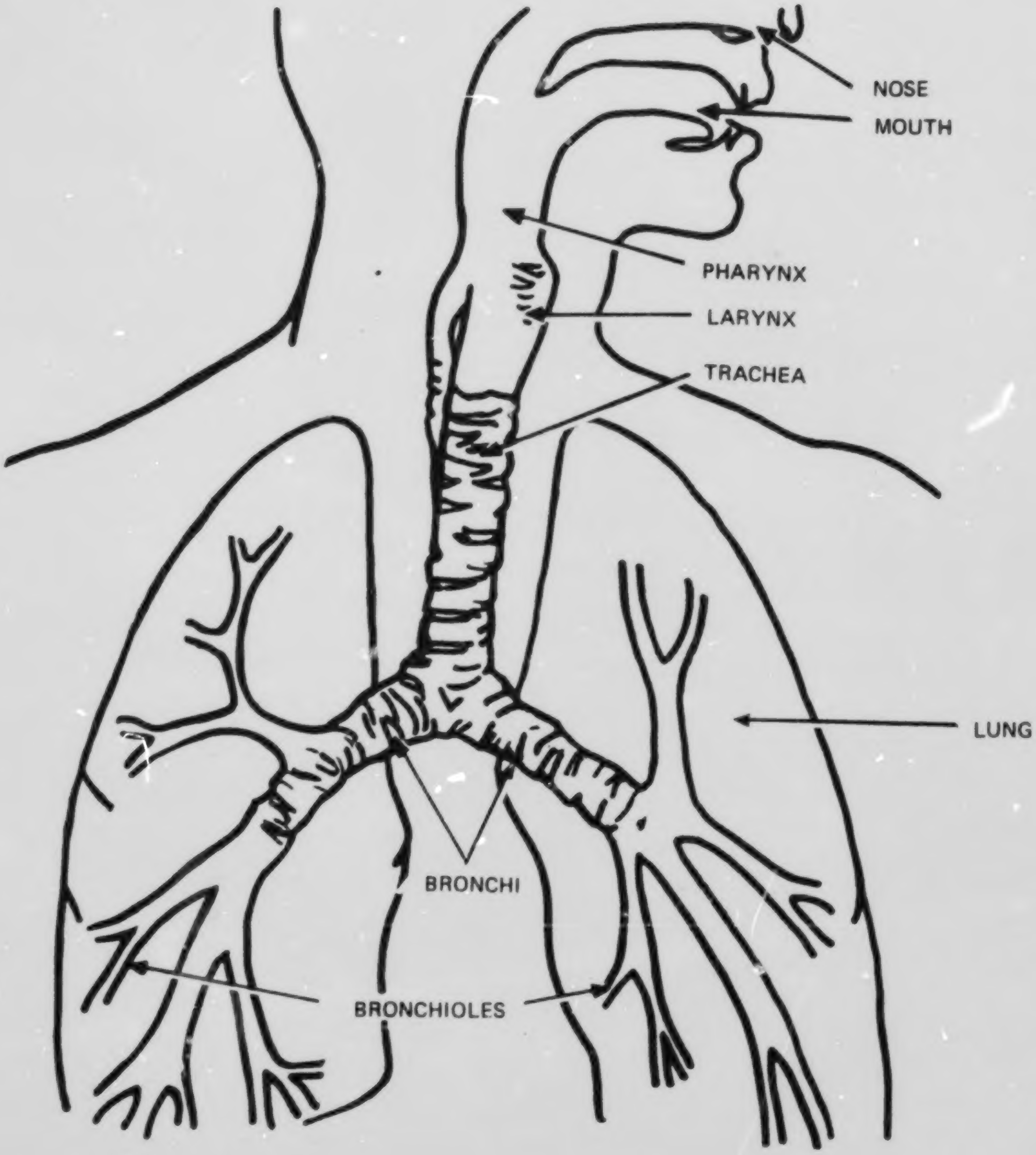
The Male Reproductive and Excretory Systems


Pituitary
Parathyroids
Thyroid
Pancreas (islet cells)
Adrenal
Ovary in female
or
Testicle in male

The Endocrine System


Brain Capillaries
Pulmonary Capillaries
Aorta
Pulmonary Artery
Left Atrium
Right Atrium
Left Ventricle
Right Ventricle
Capillaries of Chest Organs
Capillaries of Liver
Capillaries of Digestive Organs
Renal Capillaries
Capillaries of Body Wall and Reproductive Organs

The Circulatory System


NOSE
MOUTH
PHARYNX
LARYNX
TRACHEA
LUNG
BRONCHI
BRONCHIOLES

The Respiratory System

Laboratory Exercise – Organization of the Human Body

Name ____________________ Date __________

List the nine body systems and two components of each:

System **Components**

1. ____________ a. ____________
b. ____________
2. ____________ a. ____________
b. ____________
3. ____________ a. ____________
b. ____________
4. ____________ a. ____________
b. ____________
5. ____________ a. ____________
b. ____________
6. ____________ a. ____________
b. ____________
7. ____________ a. ____________
b. ____________
8. ____________ a. ____________
b. ____________
9. ____________ a. ____________
b. ____________

List the four types of connective tissue:

10. ____________ 12. ____________
11. ____________ 13. ____________

Complete the following statements by circling one of the two responses found within the parenthesis:

14. In a standing position, an individual's head is (inferior, lateral, superior) to his legs.

15. A plane which vertically divides the body into equal left and right halves is referred to as the (sagittal, midsagittal, frontal) plane.

16. The lungs are (inferior, transverse, superior) to the cranium of a human being in a standing position.

17. Both lungs can be viewed at one time on a human being from the (lateral, midsagittal, frontal) view or aspect.

18. The body cavity that contains the brain is called the (pelvic, branial, cranial) cavity.

19. The (dorsal, mid, ventral) body cavity contains the organs of digestion, reproduction, and excretion.

20. The lungs and heart are in the (spinal, thoracic, respiratory) cavity.

21. The types of tissue that support, protect, and bind other tissues together are called (supportive, connective, protective) tissues.

Complete the following:

22. Cardiac muscle is found only ____

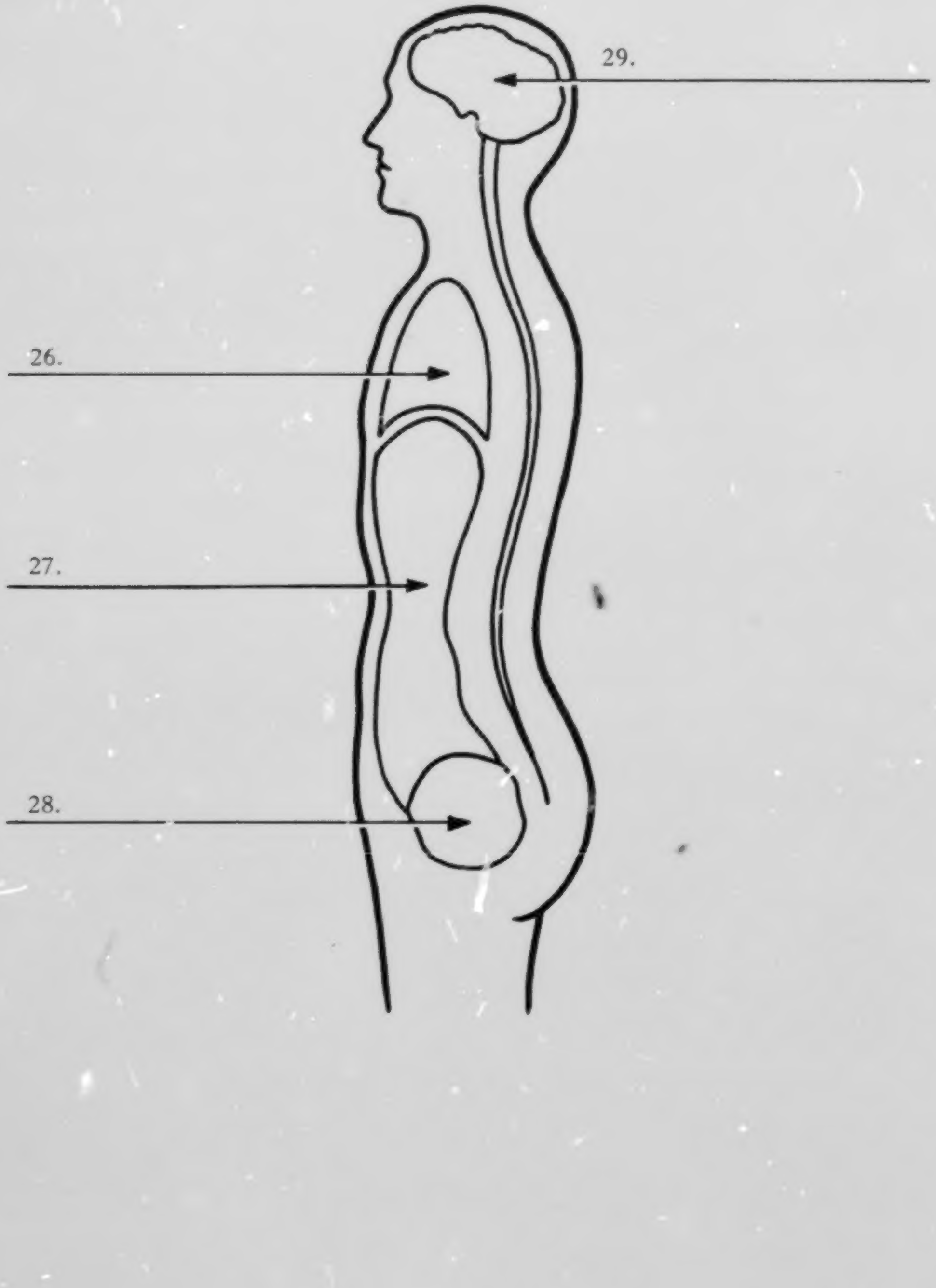
23. The mucosal lining of the mouth contains a great many ________________ cells.

24. Define physiology ____
____

25. Complete the following chart:

Molecules
↓
Cells
↓
____
↓
Organs
↓
____
↓
Human Being
(Organism)

Give the components of the following body cavities:



In your own words define the following:

30. Cell:

31. Anatomy:

32. Tissue:

33. Organ:

Objectives:

1. Correctly identify the following landmarks on an unlabeled diagram of the skull:
    - A. Frontal bone
    - B. Parietal bone
    - C. Temporal bone
    - D. Sphenoid bone
    - E. Ethmoid bone
    - F. Occipital bone
2. Correctly label major structures found on the above listed bones with 75% accuracy.
3. Correctly label all paranasal sinuses, given an unlabeled diagram.
4. Correctly list the fourteen facial bones and eight skull bones.

Equipment:

Anatomical skulls
Anatomical reference textbooks
Worksheets

1. DIVISIONS OF THE SKULL

The skull is divided into two parts. The upper part encases the brain and consists of eight bones. It is called the **cranial vault**.

The **14 facial bones** make up the anterior portion of the skull. The facial bones protect the organs found within the face. The facial bones also provide openings for the respiratory system and alimentary tract, as well as forming part of the speech apparatus. And, of course, the facial bones are responsible for a person's facial features.

2. BONES OF THE CRANIAL VAULT

A. **Frontal** – The frontal bone is the largest of the cranial bones. The frontal bone forms the anterior portion of the cranial vault, as well as part of the vault's roof and floor. It is commonly called the forehead. The top or vertex of the skull and a portion of the sides are formed by the two . . .

B. **Parietal** – parietal bones. These two make up the major portion of the roof and sides of the cranial vault.

C. **Temporal** – Just below the parietals are the temporal bones, one on each side of the skull. Together they make up a portion of the sides and floor of the cranial vault.

D. **Occipital** – The occipital bone is a single bone which forms the base and posterior wall of the skull.

E. **Sphenoid** – Sphenoid means bat-like. The sphenoid bone is located in the midskull between the temporal bones. It also forms a portion of the mid floor.

F. **Ethmoid** – Ethmoid means sieve-like. The ethmoid bone is the smallest of the cranial bones and is located behind the bridge of the nose. It forms a small part of the anterior base of the cranium and the superior portion of the nasal cavity. A portion separates the nose into nostrils. The uppermost portion anchors the anterior brain.

Each of the bones just discussed has a number of structures which can be demonstrated on radiographs. They can be used as positioning landmarks for dental radiography.

3. STRUCTURES OF THE FRONTAL BONE

A. **Superciliary arches** – There are bony ridges just above each orbit, behind the eyebrows; these are called the superciliary arches.

B. **Supra-orbital foramina** – (foramen) The supra-orbital foramina are openings in the frontal bone just beneath the superciliary arches. They provide passage for the supra-orbital nerves and blood vessels.

C. **Frontal sinuses** – The frontal bone also contains two air cavities called the frontal sinuses. These sinuses lighten the skull, give resonance to the voice, and act as a reserve chamber to warm inhaled air.

4. STRUCTURES OF THE PARIETAL BONE

A. **Parietal eminence** – The main structure of the parietal is the prominent bulge near its mid portion on the external surface called the parietal eminence.

B. The superior borders of the two parietal bones meet in the midline at the top of the skull to form the sagittal suture. The anterior border meets with the frontal bone to form the coronal suture, and the posterior border articulates with the occipital bone at the lambdoidal suture.

5. STRUCTURES OF THE TEMPORAL BONE

A. **External auditory meatus** - The first prominent structure is the external opening of the ear, which is called the external auditory meatus (EAM).

B. **Zygomatic process** – Next is the zygomatic process. It projects forward and articulates with the zygoma or malar to form the zygomatic arch. The zygomatic arch gives fullness to the cheeks.

C. **Mastoid process.** – The third prominent structure of the temporal bone is the mastoid process. This is the large, bony protuberance behind the ear. The mastoid portion of the temporal bone articulates with the parietal bone at its upper border and with the occipital bone at its posterior border. The mastoid tip contains delicate air cells that affect hearing and equilibrium. The mastoid process can vary considerably in size from person to person depending upon the amount of air cells in the mastoid. Occasionally, these air cells may be absent all together. If this is the case, the mastoid process is solid bone and usually small in size. This process is absent at birth but gradually develops during childhood and serves as an attachment for muscles of the neck.

D. **Styloid process** – The last structure of the temporal bone to be discussed is the styloid process. The syloid process is a long, slender projection of bone just below and anterior to the EAM. The styloid process is a site of attachment for ligaments and muscles, the hyoid bone and pharynx.

6. STRUCTURES OF THE OCCIPITAL BONE

A. **External occipital protuberance (EOP)** – The first structure is the external occipital protuberance or EOP, which is a prominent structure on the external occipital. This prominence can be felt on the back of the head about 2 inches above the hairline.

B. **Internal occipital protuberance (IOP)** – The internal occipital protuberance (IOP) is located on the internal surface of the occipital bone corresponding to the EOP.

C. **Foramen magnum** – The foramen magnum is a large opening through the inferior portion of the occipital bone. The spinal cord exits the cranium through the foramen magnum.

D. **Condyles** – The fourth structures of the occipital are the occipital condyles. The condyles are found on the external occipital at each side of the foramen magnum. These condyles allow the skull to rotate (articulate) on the spinal column.

7. STRUCTURES OF THE SPHENOID BONE

A. Sella turcica In Latin, sella turcica means Turkish saddle. It is the name of a structure of the sphenoid bone. The sella turcica is located on the superior surface of the body of the sphenoid. It is a saddle-shaped depression cradling the pituitary gland, one of the major hormone-secreting glands.

B. Lesser wings – The lesser wings of the sphenoid lie anterior to the sella turcica. They are thin, triangular pieces of bone which extend laterally from the body of the bone. Part of the posterior roof of the orbits is formed by their inferior surface.

C. Greater wings – The greater wings of the sphenoid bone extend laterally from the sides of the body of the bone. They form part of the floor of the cranium, a small part of its lateral walls just anterior to the temporal bones, and the posterior part of the lateral walls of the orbits.

D. Sphenoid sinuses – The body forms the center of the sphenoid. Two cavities lie within the body of the sphenoid, called the sphenoid sinuses. These communicate with the nasal cavity.

E. Pterygoid plates – Two finger-like processes project downward from both sides of the sphenoid. These are called the medial and lateral pterygoid plates respectively. These processes stabilize the roof of the mouth and floor of the nasal cavity posteriorly.

8. STRUCTURES OF THE ETHMOID BONE

A. Cribiform plate – The first structure, the cribiform plate, is the horizontal portion which forms the roof of the nasal cavity. It contains numerous foramina which serve as passageways for the olfactory nerves, which give us our sense of smell.

B. Crista galli – Projecting superiorly from the cribiform plate is the crista galli (cock's comb). It is a smooth, triangular projection which acts as an attachment point for the covering of the anterior brain.

C. **Perpendicular plate** – The third structure of the ethmoid is also a plate – the perpendicular plate. The perpendicular plate projects downward from the cribiform plate. This plate forms the superior-anterior portion of the nasal septum. The nasal septum is a partition separating the nasal cavity into two nostrils.

D. **Ethmoid sinuses** – The fourth structure are the lateral labyrinths (masses) of the perpendicular plate. These are scroll-shaped, long, thin bony processes located along the lateral walls of the nasal cavity. As the lateral masses curve back on each other, they form the air cavities known as the ethmoid sinuses. Attached to the lateral labyrinths are two processes of thin, cancellous bone, known as the superior and middle conchae. These conchae are covered with mucous membrane and act to stir and warm inhaled air.

9. SUTURE LINES

The lines along which the bones join are called **suture lines.** The suture lines form immovable joints because of the zig zag edges which come together to prevent movement.

There are four main suture lines.

A. **Coronal or Frontal** – The coronal suture joins the frontal and parietal bones.

B. **Lambdoidal** – The parietal and occipital bones are joined by the lambdoidal suture.

C. **Squamous** – The squamous suture joins the parietal and the temporal bones.

D. **Sagittal** – The sagittal suture joins the two parietal bones.

10. JUNCTIONS AND FONTANELS

Not only are the various bones of the skull joined by suture lines, but the suture lines themselves also come together at various **junction** points. In infants these junctions are called fontanelles. Because the skull bones are not completely formed at birth, some areas of the brain are not protected. These gaps between the edges of the developing bones are **fontanels.**

Junction points:

A. **Bregma** – The bregma is the union of the coronal and satittal sutures.

B. **Lambda** – The other junction is called the lambda. It is the posterior junction of the sagittal and lambdoidal sutures.

Six fontanels are usually present at the time of birth.

A. **Anterior** – This fontanel is the largest one and is found between the frontal and the two parietal bones. This fontanel remains open the longest. It closes completely at about 18 months of age.

B. **Posterior** – This fontanel usually closes during the first year. It is found between the occipital and the two parietal bones.

C. **Anterolateral** – Found between the parietal, frontal and sphenoid bones.

D. **Posterolateral** -- Found between the parietal, occipital, and temporal bones.

OSTEOLOGY OF THE FACIAL BONES

11. FACIAL BONES

There are 14 facial bones which make up the remainder of the skull.

A. **Nasal bones** – The nasal bones are the two small paired bones which make up the bridge of the nose.

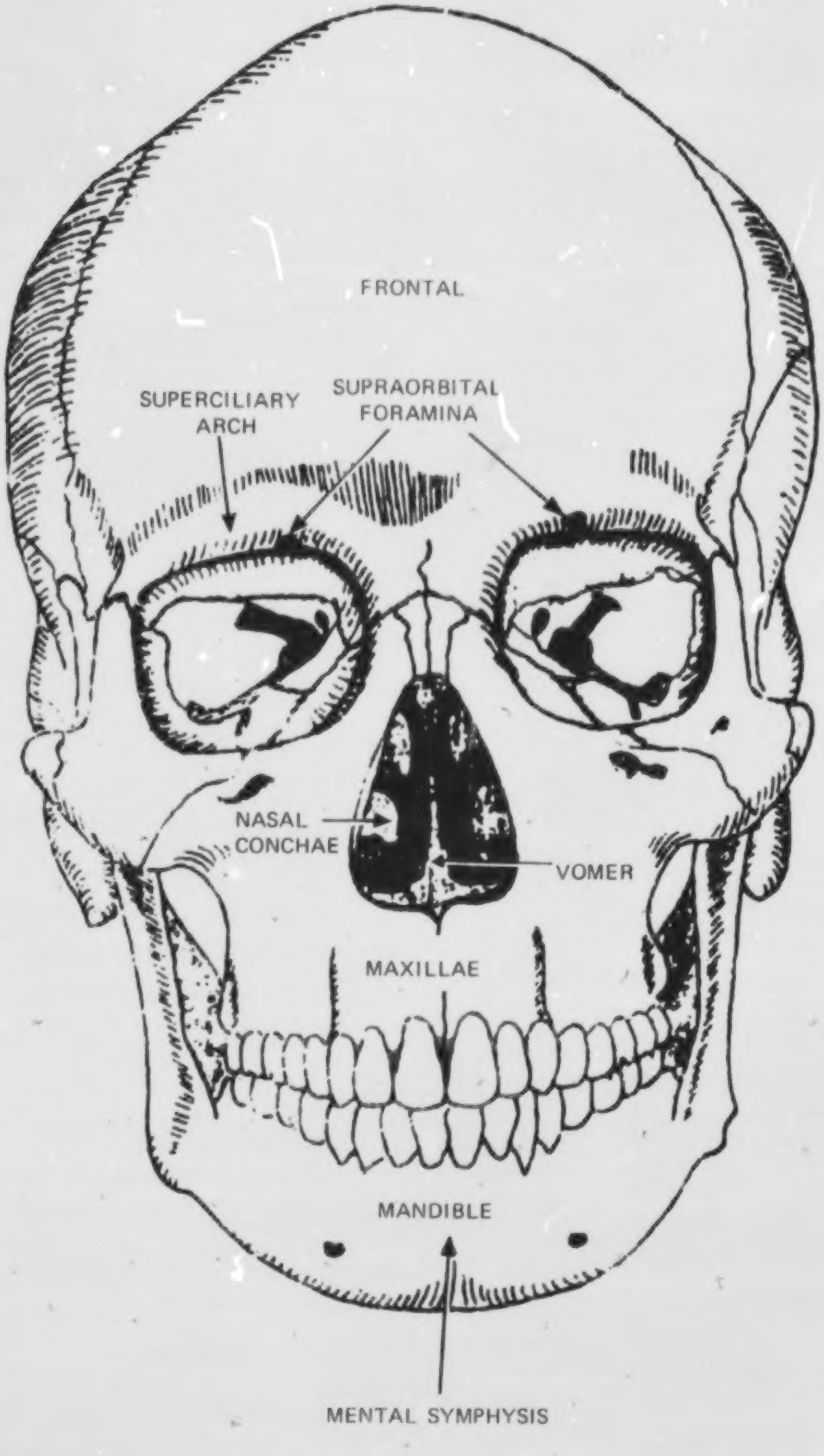
B. **Maxillae** – The two maxillae form the upper jaw and hold the upper teeth in place. They also form a portion of the roof of the mouth, the lateral wall of the nasal cavity, and the floor of the orbits. The maxillae join at the midpalatine or median suture. They give shape to the face and support both deciduous and secondary teeth as well as forming part of the roof of the mouth.

C. **Lacrimal bones** – The lacrimal bones are the smallest and most delicate bones of the facial skeleton. They resemble a fingernail in size and shape and contain the lacrimal sacs and nasolacrimal ducts (tear ducts). They are located at the anterior portion of the inner surface of the orbit.

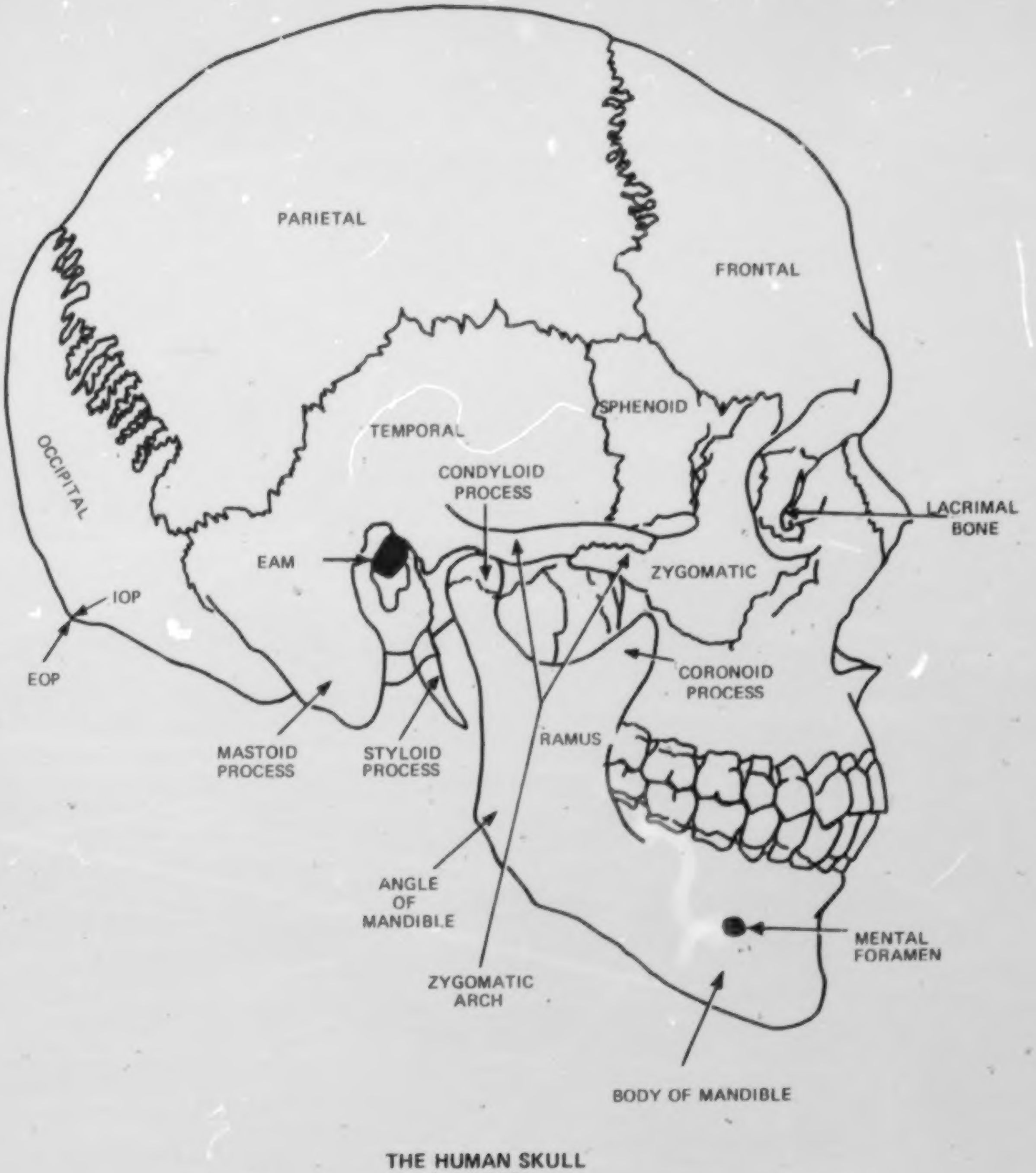
D. **Zygomatic bones** – The zygomatic or malar bones are commonly called the cheekbones. They form parts of the orbits as well. A slender, bony projection extends posteriorly to join the zygomatic process of the temporal bone. These two structures combine to form the zygomatic arch. This bone serves as an attachment for muscles of mastication and facial expression.

E. **Mandible** – The mandible forms the lower jaw and houses the lower teeth. It is the largest bone of the face.

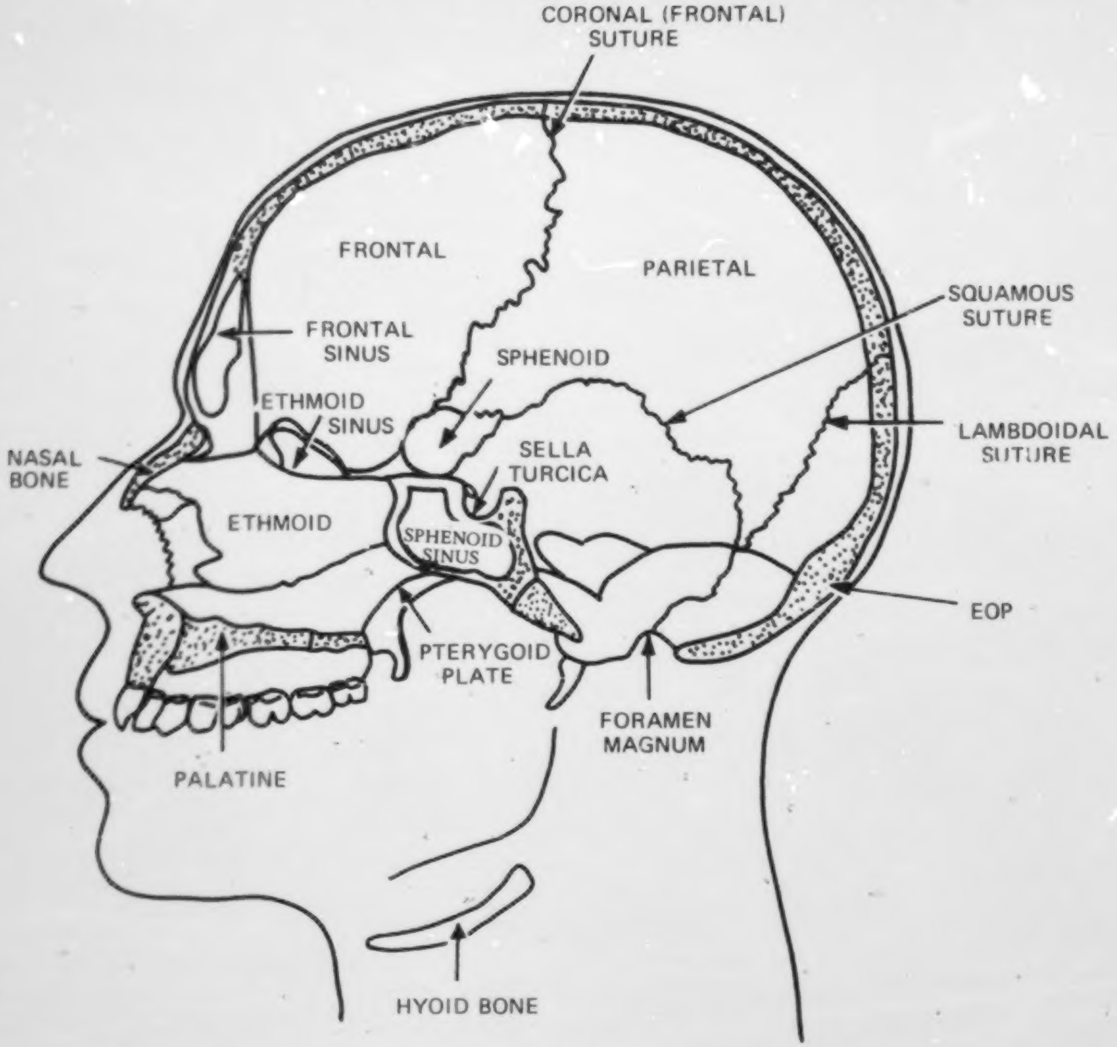
--**Body** – The body is the curved central part of the mandible. It is horseshoe-shaped and extends from one mandibular angle to the other.


FRONTAL
SUPERCILIARY ARCH
SUPRAORBITAL FORAMINA
NASAL CONCHAE
VOMER
MAXILLAE
MANDIBLE
MENTAL SYMPHYSIS

THE HUMAN SKULL
Anterior View

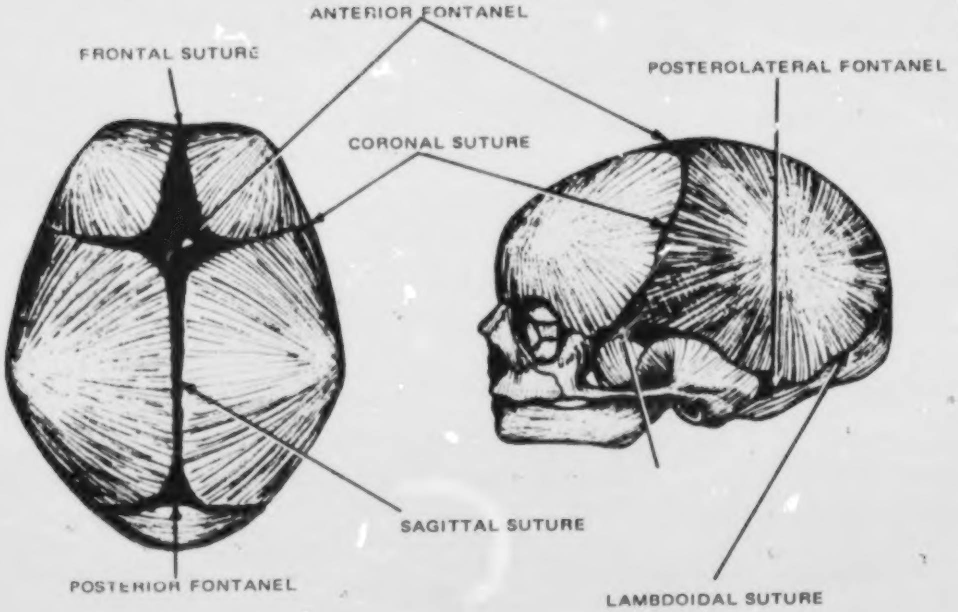

PARIETAL
FRONTAL
OCCIPITAL
TEMPORAL
SPHENOID
CONDYLOID PROCESS
LACRIMAL BONE
EAM
ZYGOMATIC
IOP
EOP
CORONOID PROCESS
RAMUS
MASTOID PROCESS
STYLOID PROCESS
ANGLE OF MANDIBLE
MENTAL FORAMEN
ZYGOMATIC ARCH
BODY OF MANDIBLE

THE HUMAN SKULL
Lateral View


CORONAL (FRONTAL) SUTURE
FRONTAL
PARIETAL
SQUAMOUS SUTURE
FRONTAL SINUS
SPHENOID
ETHMOID SINUS
LAMBDOIDAL SUTURE
NASAL BONE
SELLA TURCICA
ETHMOID
SPHENOID SINUS
EOP
PTERYGOID PLATE
FORAMEN MAGNUM
PALATINE
HYOID BONE

SAGITTAL VIEW OF LANDMARKS OF THE SKULL

111


ANTERIOR FONTANEL
FRONTAL SUTURE
POSTEROLATERAL FONTANEL
CORONAL SUTURE
SAGITTAL SUTURE
POSTERIOR FONTANEL
LAMBDOIDAL SUTURE

THE AXIAL SKELETON

--Mandibular angles –	The angles of the mandible are the rounded areas of the lower jaws where the horizontal part of the body bends upward to an almost vertical position.
--Mental symphysis –	In infancy the mandible consists of two distinct "L" shaped pieces which fuse together by the second year. This fusion line is called the mental symphysis.
--Mental foramina–	The mental foramina are the anterior openings for the nerves and blood vessels that supply the symphysis area of the mandible.
--Rami (Ramus) –	The two rami of the mandible are those parts of the bone extending upward from the body of the mandible.
--Coronoid processes –	The coronoid processes are the anterior processes of the rami. The coronoid process is suspended by soft tissue only and does not articulate with any other bone.
--Condyloid processes –	The condyloid processes are the posterior processes of the rami. They articulate with the temporal bones.
--Condyle and neck –	The condyloid processes each have two parts, the condyle and the neck. The condyle is the articular portion, while the neck is the constricted portion just below the condyle.
--Temporomandibular joint –	The only movable joint in the skull is the temporomandibular joint. This joint is formed by the mandibular fossa of the temporal bone and the condyle of the mandible. The joint is located in front of the EAM and can be palpated. The purpose of this joint is to allow the mouth to open and close. This joint is known as a diarthrotic joint, because it allows motion up and down, backward and forward, and also slightly from side to side.
--Mandibular notch –	The depression between the coronoid and condyloid processes is called the mandibular notch.
F. Vomer	The vomer, a flat, thin bone which forms the postero-inferior part of the nasal septum, is located behind the perpendicular plate of the ethmoid bone. The upper border of its anterior aspect articulates with the inferior surfaces of the perpendicular plate forming the nasal septum.

G. **Palatine bones** – The palatine bones are just posterior to the maxillae in the roof of the mouth. When the palatine bones and the palatine processes of the maxillae fail to join, then the abnormality known as cleft palate results.. .

H. **Nasal conchae or turbinates** – Each nasal concha consists of spongy bone curled upon itself like a scroll. These conchae are attached to the outer wall of the nasal cavity on each side. The mucous membrane covering each concha acts to moisten and warm inhaled air.

12. SINUSES

During the discussion of the structures of the skull, air cavities called sinuses were mentioned. The paranasal sinuses are the frontal, ethmoid, sphenoid, and maxillary. They are lined by ciliated mucous membranes directly continuous with that of the nasal cavities. All sinuses communicate with the nasal cavity and oral pharynx. When they become inflamed, the sinuses swell and become congested and a condition called **sinusitis results.**

A. **Frontal sinuses** – The frontal sinuses are situated within the frontal bone.

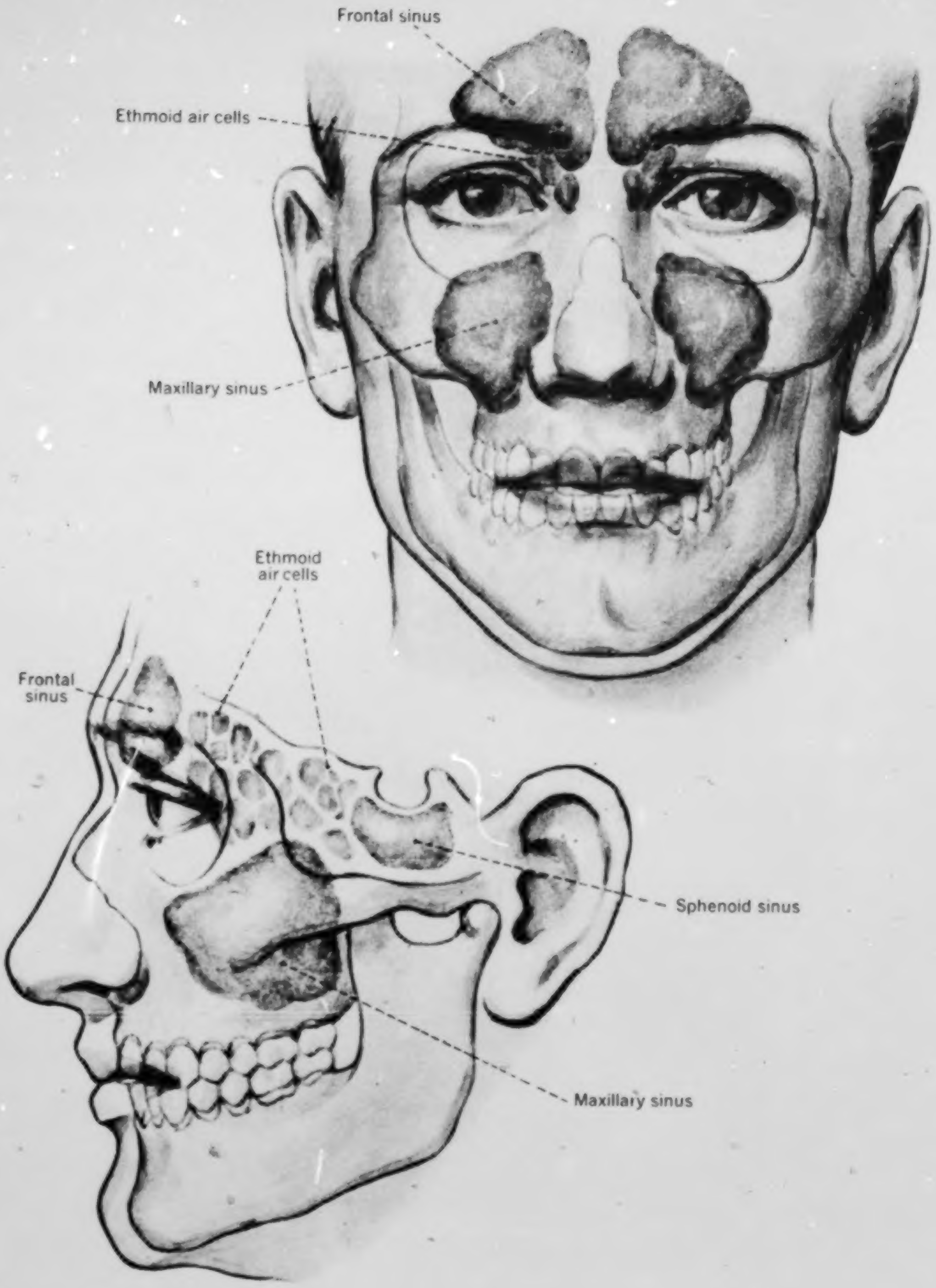
B. **Ethmoid sinuses** – The ethmoid air cells consist of numerous thin-walled cavities formed by the lateral labyrinth.

C. **Sphenoid sinuses** – The sphenoid sinuses are contained within the body of the sphenoid.

D. **Maxillary sinus** – The maxillary sinuses are the largest of the accessory sinuses. They are located in the body of the maxilla.

13. HYOID BONE

The **hyoid bone** is not considered to be a facial bone. It is U-shaped and located at the anterior part of the neck at the level of the cervical 3rd vertebrae. The hyoid bone is suspended from the styloid processes of the temporal bones by stylohyoid ligaments. It functions as an attachment point for various muscles which move the tongue and aid in speaking and swallowing.


Frontal sinus
Ethmoid air cells
Maxillary sinus
Ethmoid air cells
Frontal sinus
Sphenoid sinus
Maxillary sinus

Laboratory Exercise I – Anatomical Landmarks

Name ______________________________ Date ____________

Utilizing the skulls and reference textbooks, label the four diagrams provided on the following pages with the following structures:

- Frontal bone
  - Superciliary arch
  - Supra-orbital foramen
- Parietal bone
  - Parietal eminence
- Temporal bone
  - EAM
  - Zygomatic process
  - Zygomatic arch
  - Mastoid process
  - Styloid process
- Occipital bone
  - EOP
- Sphenoid bone
- Ethmoid bone
- Suture lines
  - Coronal (frontal)
  - Lambdoidal
  - Squamous
- Nasal bone
- Maxilla
- Lacrimal bone
- Mandible
  - Mental foramen
  - Ramus
  - Angle
  - Body
  - Mental symphysis
  - Coronoid process
  - Condyloid process
  - Mandibular notch
- Vomer
- Nasal concha
- Sinuses
  - Frontal
  - Ethmoid
  - Sphenoid
  - Maxillary

Laboratory Exercise II

Name ______________________________ Date ____________

On an articulated skull, point out the following landmarks for evaluation by your instructor:

- Occipital bone
  - Foramen magnum
  - Condyles

- Sphenoid bone
  - Sella turcica
  - Lesser wing
  - Greater wing

- Ethmoid bone
  - Cribiform plate
  - Crista galli
  - Perpendicular plate

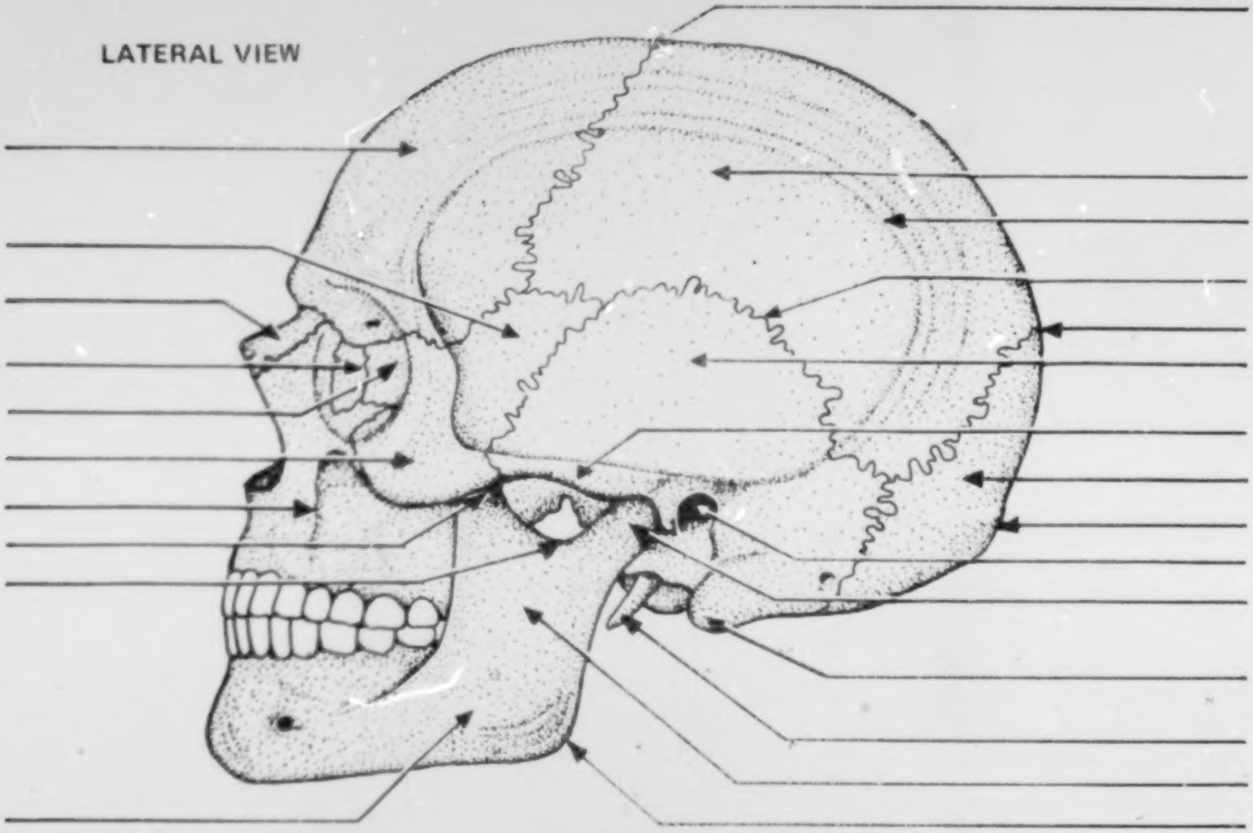
- Suture lines
  - Sagittal

- Fontanelles
  - Anterior
  - Posterior
  - Anterolateral
  - Posterolateral

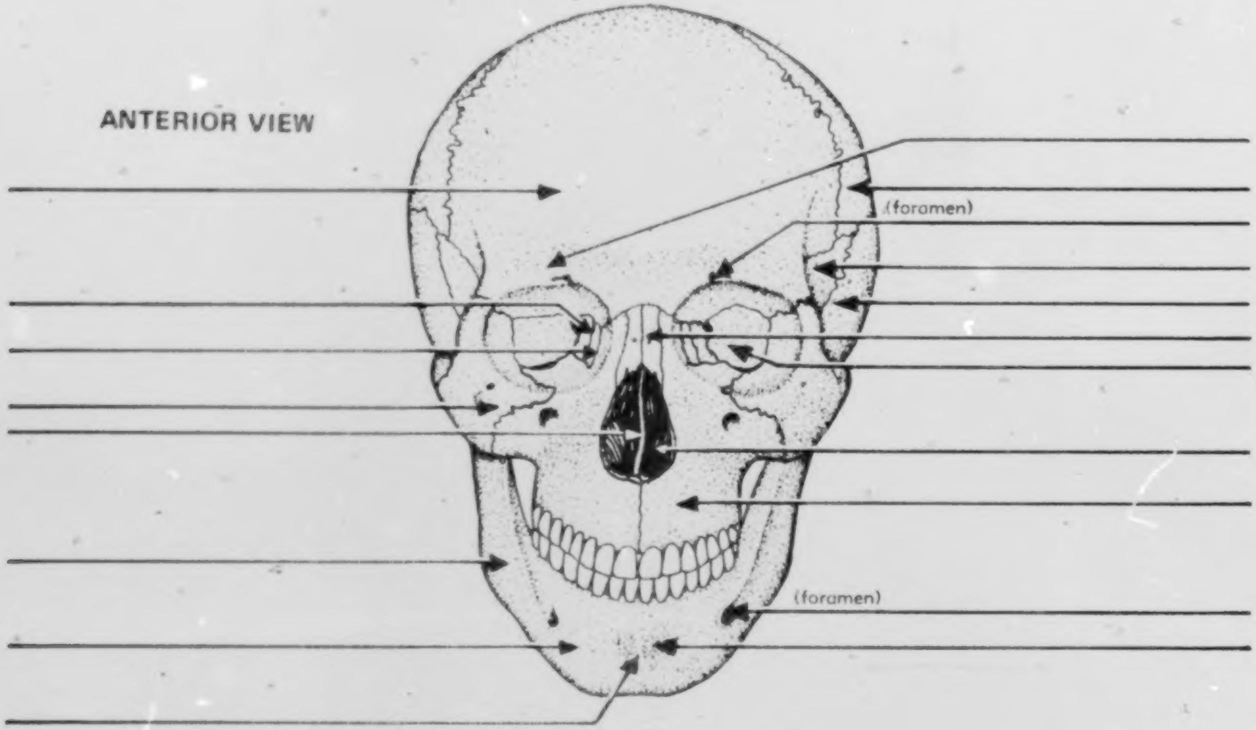
- Mandible
  - Condyle and neck

- Palatine bone

LATERAL VIEW



ANTERIOR VIEW


(foramen)
(foramen)

Laboratory Exercise III – Anatomical Landmarks

Name ______________________________ Date ____________

1. The only movable bone found in the skull is the ____________________

2. The mandible articulates with the ______________ bone to form the temporomandibular joint.

3. The largest sinus is the ___________ sinus.

4. The mental foramen functions as _________________________________.

5. The ___________ bone is the largest facial bone.

6. The ___________ bones are the smallest facial bones.

7. The zygomatic process joins the zygomatic bone to form the ______________.

Define, in your own words, the following terms as they relate to dental anatomy:

8. foramen ____

9. process ____

10. articulation ____

11. fossa ____

12. sinus ____

13. coronal ____

14. auditory ____

15. orbit ____

16. condyle ____

17. fontanel ____

18. nasal ____

19. meatus ____

20. landmark ____

Objectives:

1. List the four major muscles of mastication and state their origin, insertion, and action.
2. Given a diagram, locate and identify the major muscles of mastication.
3. List the four muscles of the floor of the mouth.
4. Given a diagram, locate and identify the muscles of the floor of the mouth.
5. List the extrinsic muscles of the tongue; give their origin, insertion, and action.
6. Given a diagram, locate and identify the extrinsic muscles of the tongue.
7. List five major muscles of facial expression.

Equipment:

Anatomical skulls
Skulls with muscle attachments
Resource texts
Worksheets

Procedure:

For each set of muscles, using texts, worksheets, etc., locate these muscles on the anatomical skull. Utilizing the hinged skulls, attempt to visualize the action of the muscle also.

MAJOR MUSCLES OF MASTICATION

Masseter

Origin: Zygomatic arch

Insertion: Lateral surface of the ramus and angle of the mandible

Action: Closes jaw.

The masseter muscle is rectangular in shape and covers the greater part of the lateral surface of the ramus of the mandible. It originates on the zygomatic arch and continues downward to the angle of the mandible and external surface of the ramus. By gently opening and closing your jaw, palpate the area over the masseter. It can be easily felt this way and its location and action made clearer.

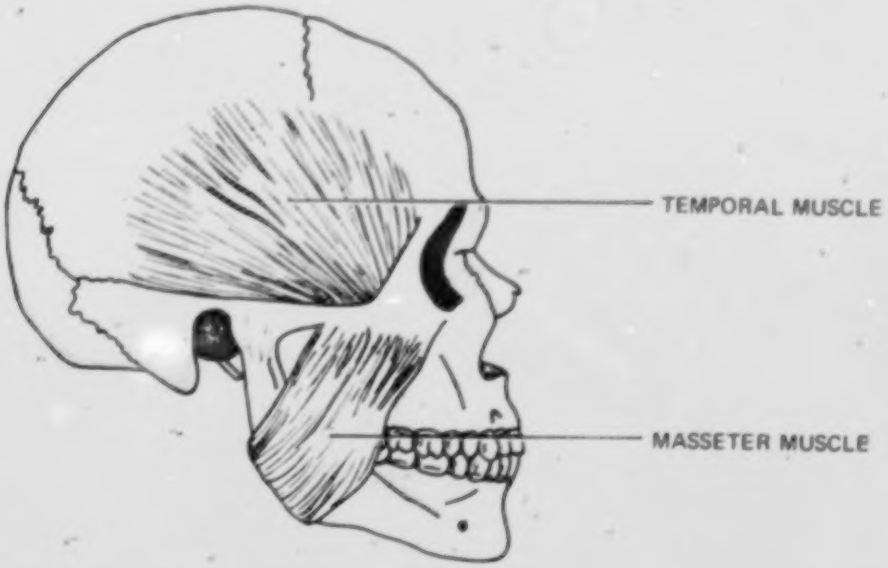
Temporal or Temporalis

Origin: Outside surface of the temporal bone

Insertion: Coronoid process of the mandible

Action: Closes the jaw, protrudes and retracts the mandible.

The temporal muscle is the largest muscle of mastication. It is fan-shaped and flares out from the temporal bone to the coronoid process of the mandible. The temporal muscle functions to close the jaw, protrude the mandible, and retract the mandible.



Muscles of Mastication

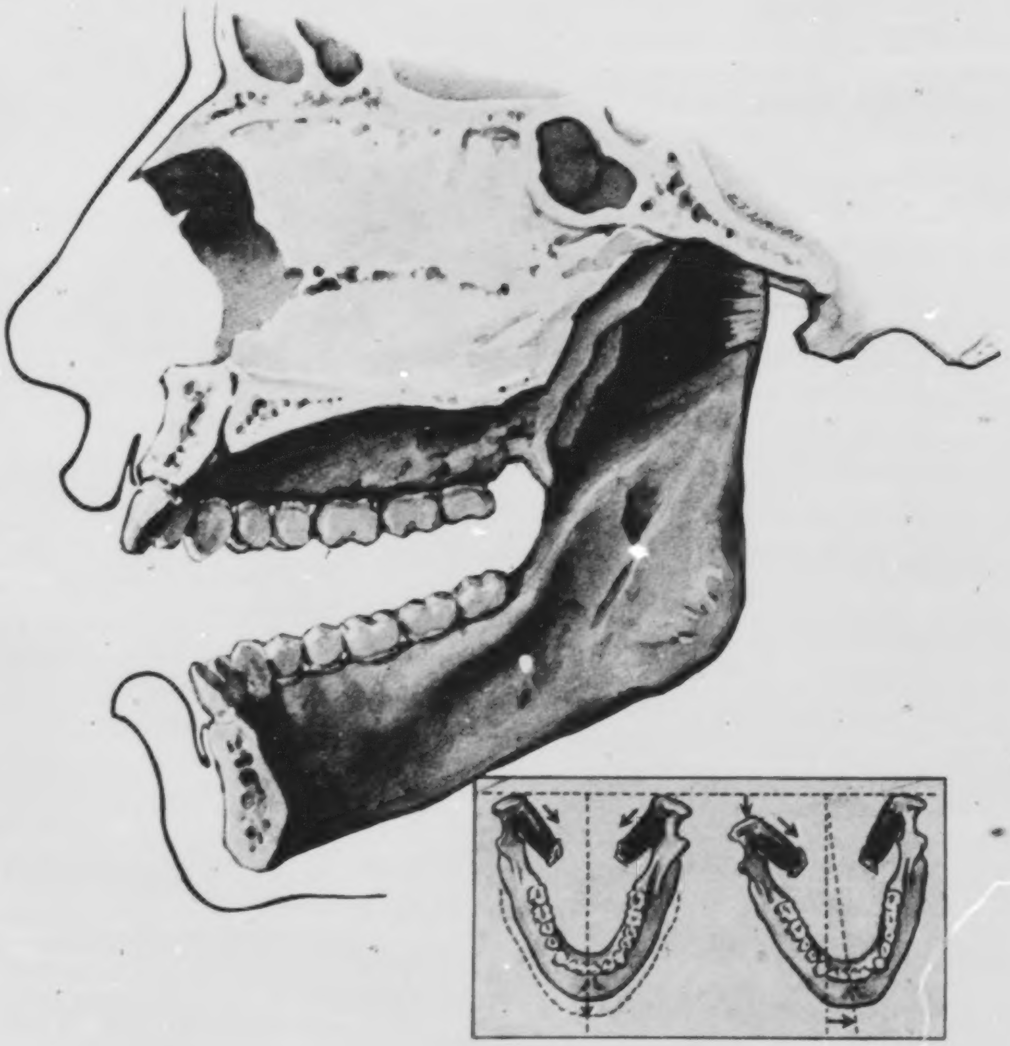
Pterygoid, External (Lateral)

Origin: Pterygoid process of the sphenoid bone

Insertion: Neck of the condyle of the mandible, articular disc joint

Action: Opens jaw and protrudes jaw.

The external pterygoid muscle is triangular in shape. It begins near the lateral surface of the external pterygoid plate of the sphenoid bone and also above the greater wing of the sphenoid bone (infratemporal surface.) It inserts in front of the condylar neck of the mandible and also in the disc of the temporomandibular joint. The external pterygoids open, protrude, and shift muscles of the jaw.



The external pterygoid muscle

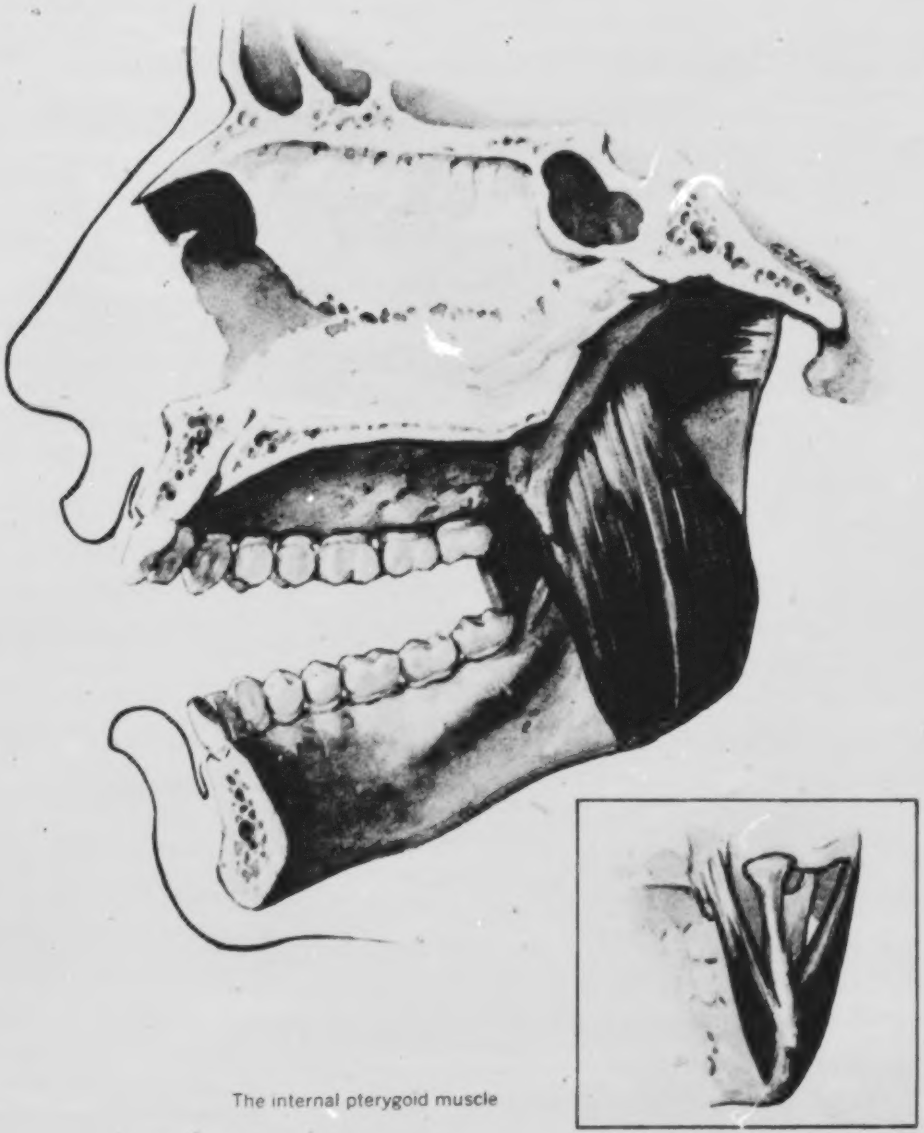
Pterygoid, Internal (Medial)

Origin: Two origins: Pterygoid plate of the sphenoid bone and palatine bone.

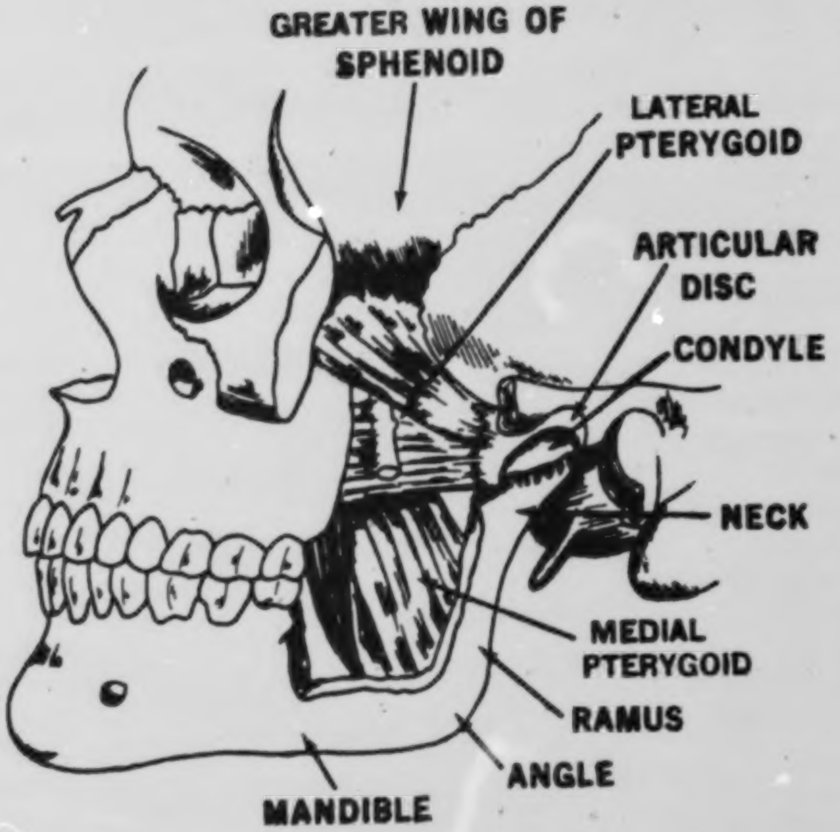
Insertion: Medial surface of the mandible between the angle and the mylohyoid groove

Action: Closes jaw: lateral movements of the jaw.

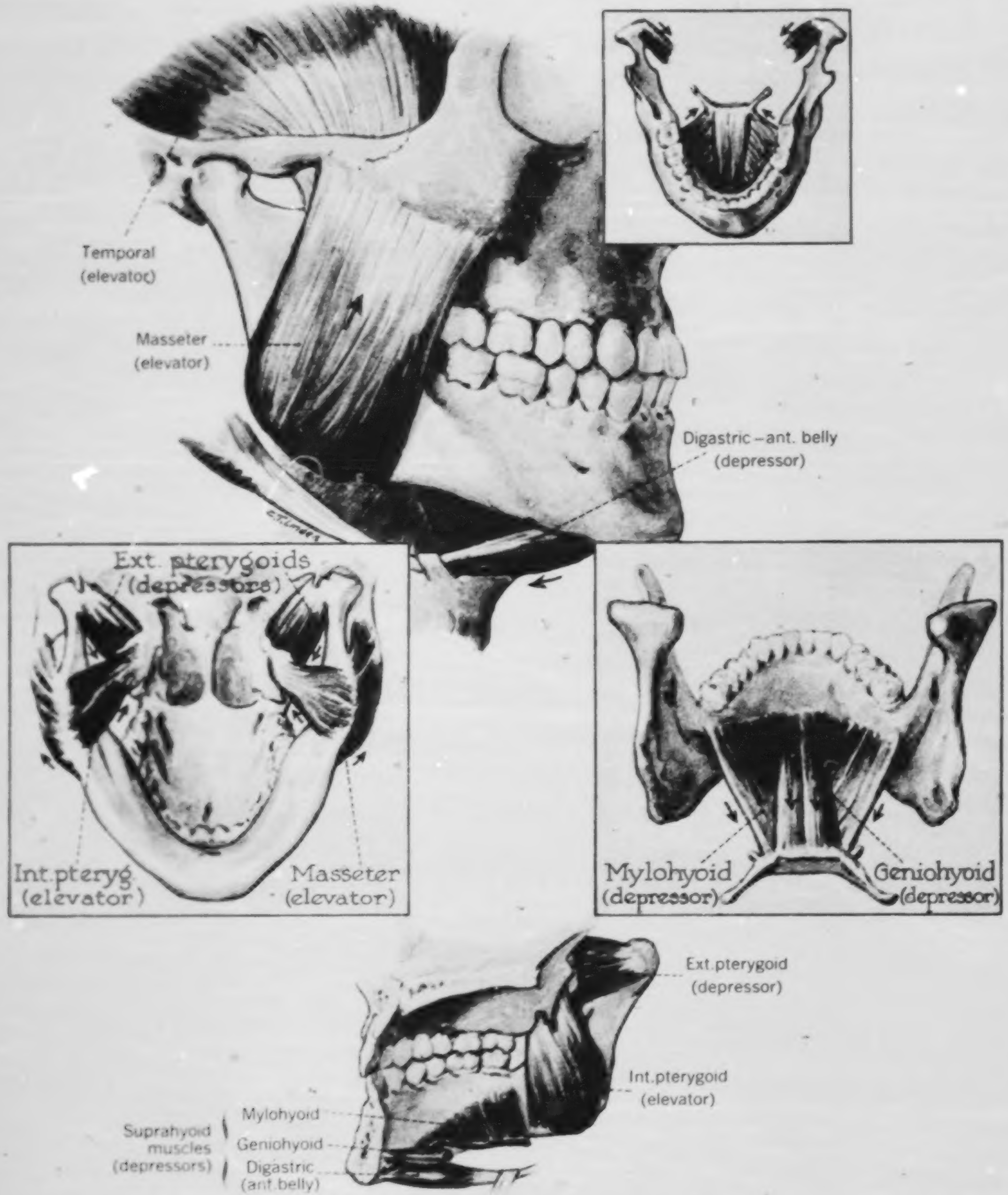
The internal pterygoid muscle is rectangular in shape and originates from the pterygoid plate of the sphenoid bone. It also originates from the pyramidal process of the palatine bone. It passes downward and backward to insert into the internal surface of the ramus and angle of the mandible opposite the region of insertion of the masseter muscle. The internal pterygoid closes the jaw (elevates mandible) and functions in the lateral movements of the mandible. When acting together, they impart a rotary, grinding action to the molar teeth and act as a nutcracker with forcing, crushing power. They also act as a natural splint to prevent displacement in fractures of the ramus of the mandible.



The internal pterygoid muscle

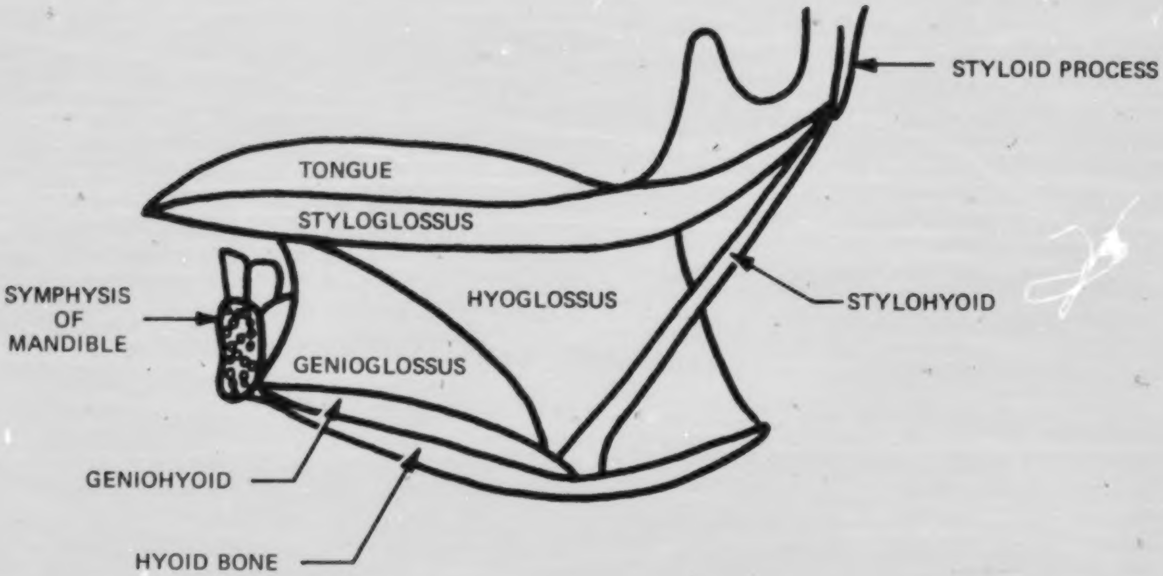

GREATER WING OF SPHENOID
LATERAL PTERYGOID
ARTICULAR DISC
CONDYLE
NECK
MEDIAL PTERYGOID
RAMUS
ANGLE
MANDIBLE

Medial and lateral pterygoid muscles


Temporal
(elevator)
Masseter
(elevator)
Digastric – ant. belly
(depressor)
Ext. pterygoids
(depressors)
Int. pteryg.
(elevator)
Masseter
(elevator)
Mylohyoid
(depressor)
Geniohyoid
(depressor)
Ext. pterygoid
(depressor)
Int. pterygoid
(elevator)
Suprahyoid
muscles
(depressors)
Mylohyoid
Geniohyoid
Digastric
(ant. belly)

The Muscles of Mastication

Extrinsic Muscles of the Tongue and Floor of the Mouth


STYLOID PROCESS
TONGUE
STYLOGLOSSUS
SYMPHYSIS OF MANDIBLE
HYOGLOSSUS
STYLOHYOID
GENIOGLOSSUS
GENIOHYOID
HYOID BONE

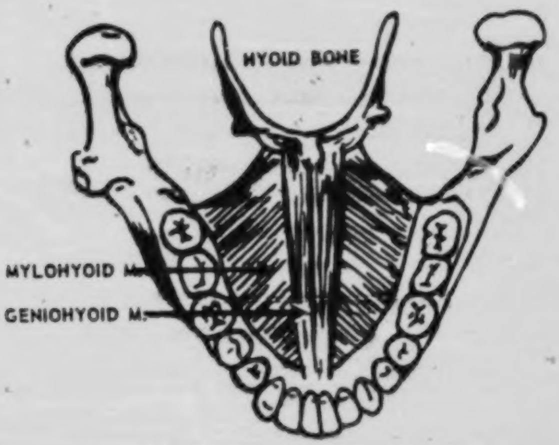
Styloglossus
Origin: Lower end of the styloid process of the temporal bone
Insertion: Side and under surface of the tongue
Action: Retracts the tongue.

Hyoglossus
Origin: Body and crest of the hyoid bone
Insertion: Side of tongue
Action: Retracts and pulls down the side of the tongue.

Genioglossus
Origin: Mental spine of the mandible
Insertion: Lingual fascia beneath the mucous membrane and epiglottis
Action: Depresses and protrudes the tongue.

Geniohyoid
Origin: Mental spine of the mandible
Insertion: Body of the hyoid bone
Action: Draws the hyoid bone forward and depresses the jaw when the hyoid bone is fixed.

Stylohyoid
Origin: Styloid process of the temporal bone
Insertion: Hyoid bone
Action: Fixes the hyoid bone.



Mylohyoid and Geniohyoid Muscles

Mylohyoid

Origin: Mylohyoid line of the mandible

Insertion: Upper border of the hyoid bone

Action: Anatomically and functionally it forms the floor of the mouth, elevates the tongue, and depresses the jaw when the hyoid bone is fixed.

Digastric (See pg. 112)

Origin: Posterior belly from the digastric groove medial to the mastoid process

Insertion: Anterior belly into the lower border of the mandible near symphysis

Action: Composed of two bellies united by a central tendon which is connected to the body of the hyoid bone. The posterior belly helps to fix the hyoid bone; the anterior belly depresses the jaw.

Major Muscles of Facial Expression

Buccinator

Origin: Alveolar processes of the mandible and maxilla
Insertion: Fibers of the orbicularis oris at the angle of the mouth
Action: Compresses the cheeks, holds food in contact with the teeth and retracts the angles of the mouth.

Mentalis

Origin: Below anterior area of the lateral incisor of the mandible
Insertion: Skin of chin
Action: Raises and wrinkles skin of the chin area and pushes up the lower lip.

Orbicularis Oris

Origin: Many layers of fibers surrounding the mouth
Insertion: Angles of the mouth
Action: Closes the lips and protrudes them. Referred to as the "kissing" muscle.

Platysma

Origin: Fascia of the pectoralis major and the deltoid muscle
Insertion: Lower border of the mandible, skin of the cheek and corner of the mouth
Action: Depresses the jaw and lower lip, wrinkles the skin of the neck area.

Risorius

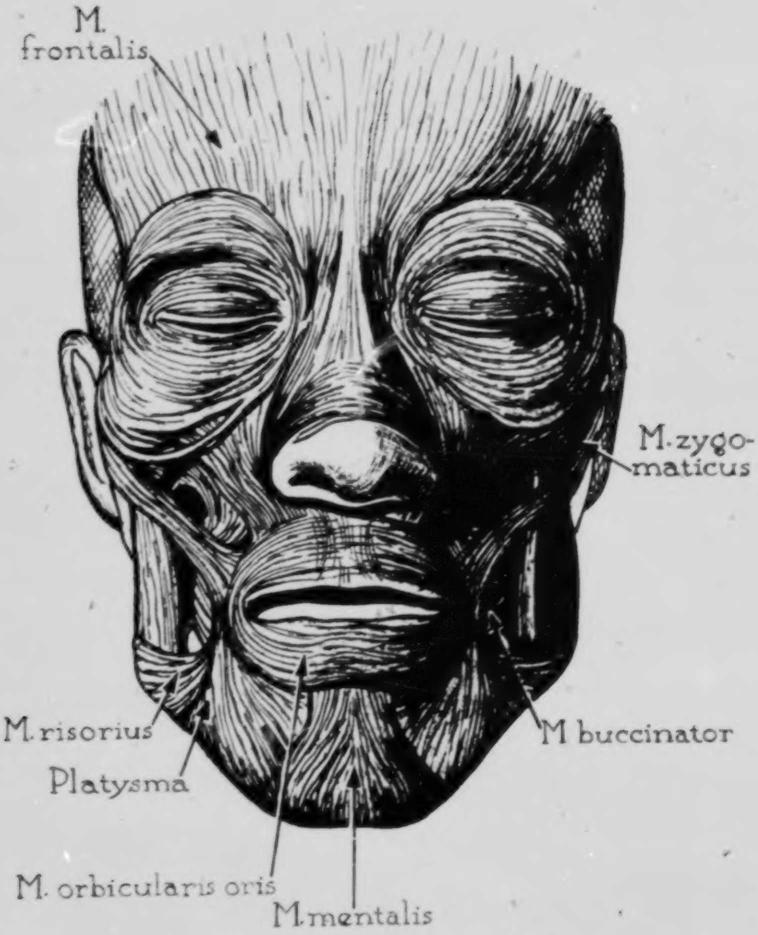
Origin: Fascia of the masseter muscle over the parotid gland
Insertion: Angle of the mouth, fibers of the orbicularis oris
Action: Draws the angle of the mouth outward.

Zygomaticus

Origin: Zygomatic bone
Insertion: Angle of the mouth, fibers of the orbicularis oris
Action: Draws angles of the mouth upward and backward as in laughing.

Frontalis

Origin: Epicranial aponeurosis
Insertion: Skin of the eyebrow, root of the nose
Action: Elevates eyebrows, wrinkles the forehead.


M. frontalis
M. zygomaticus
M. risorius
Platysma
M buccinator
M. orbicularis oris
M. mentalis

Muscles of Facial Expression; Anterior View.
(Anson, *An Atlas of Human Anatomy*, 2nd Edition.)

Laboratory Exercise – Muscles of the Head and Neck

Name ______________________________ Date __________

1. The orbicularis oris muscle is sometimes referred to as the ______________ muscle.

2. The masseter muscle inserts ______________________________

____

3. The external pterygoid muscle originates ______________________________

____.

4. The fan-shaped muscle spread broadly across the lateral aspect of the skull is referred to as the ______________ muscle.

List the four major muscles of mastication:

5. ______________________________

6. ______________________________

7. ______________________________

8. ______________________________

9. For a skeletal muscle to move the parts of the body, one end of the muscle must be attached to a more movable part and the other to a more fixed or less movable part. This less movable end of the muscle is referred to as the ______________ .

10. The ______________ muscle originates on the temporal bone.

11. Several of the smaller muscles of the floor of the mouth are attached to the ______________ bone.

12. The central part of a muscle is called the body or ____________ of the muscle.

13. The word "palpate" means ______________________________

14. Many muscles work in pairs: one is called an elevator and the other a __________

15. Name two muscles of the tongue.

____

____

16. Name four muscles of facial expression.

____

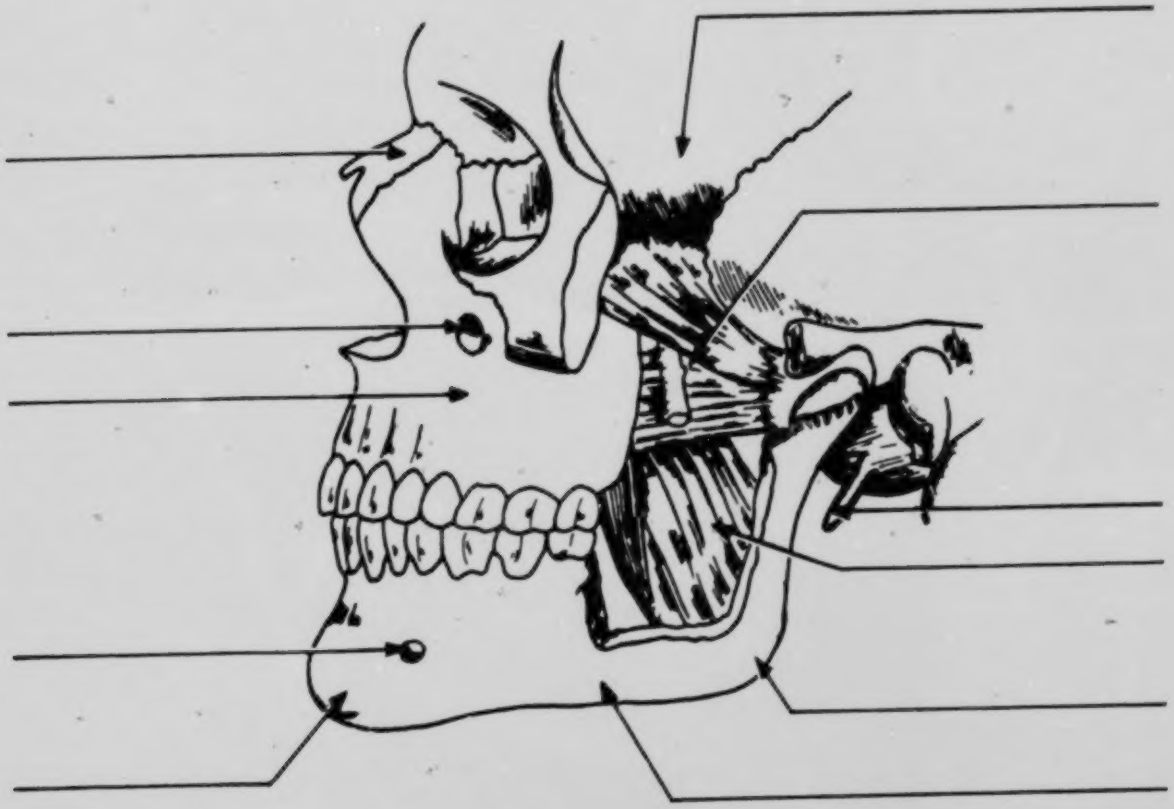
____

____

____

17. Identify the following on the illustration below:

- Greater wing of the sphenoid bone
- Lateral pterygoid
- Maxilla
- Mental foramen
- Symphysis
- Infraorbital foramen
- Medial pterygoid
- Mandible
- Angle of the mandible
- Styloid process
- Nasal bone



Objectives:

1. Given an articulated skull, locate the temporomandibular joint.
2. List the three articulation parts of the temporomandibular joint and be able to identify them on a diagram or illustration.
3. Explain in writing the function of the temporomandibular joint.
4. List the muscles involved in the functioning of the temporomandibular joint.

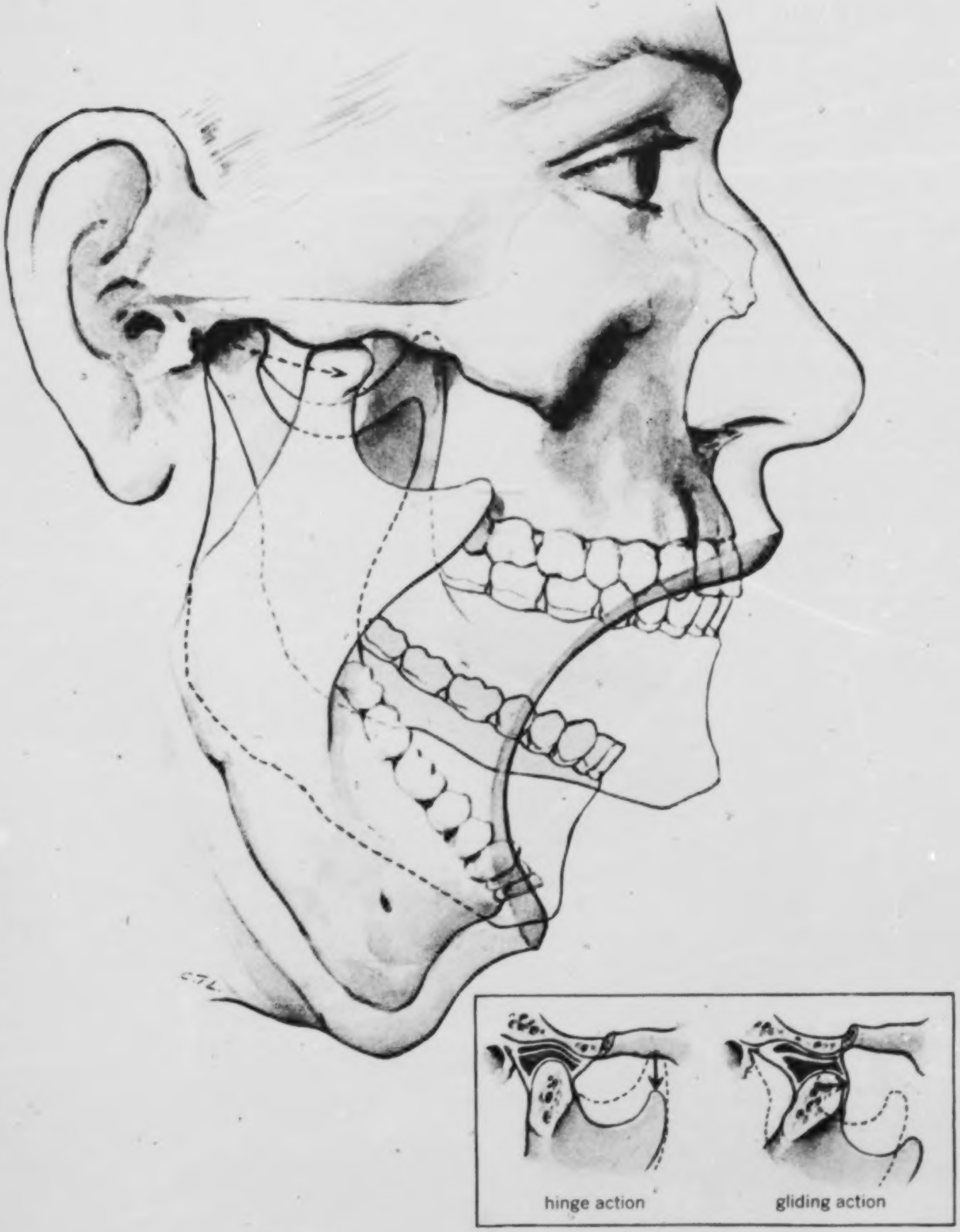
Equipment:

Articulated anatomical skulls
Reference textbooks
Illustrations

Study the skull while also attempting the following movements with your own temporomandibular joint by placing a finger on either side of your face just in front of your ears and opening and closing your mouth. Remember: the anatomical skull no longer has a synovial fluid sac or articulated disc.

The temporomandibular joint articulates or connects the mandible and temporal bones of the skull. It is referred to as a bilateral articulation, meaning that the articulation occurs on both sides of the skull. The temporomandibular joint is the only free-moving articulation in the skull; all others are immovable joints referred to as sutures.

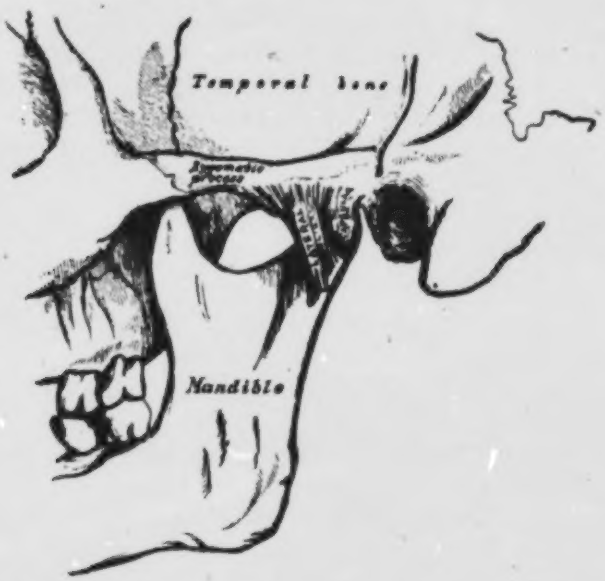
By placing your fingers on either side of your face just in front of your ears and opening and closing your mouth you will be able to easily palpate your own temporomandibular joint. Another way to palpate the temporomandibular joint is by placing your finger inside an ear and opening and closing your mouth and moving the mandible from side to side. Attempt to do the same with the articulated skull. As before, it must be kept in mind that there is no longer a disc or synovial sac within the skull, because the disc is not bone.


C.T.L.
hinge action
gliding action

The Temporomandibular Joint

Articulating Parts of the Temporomandibular Joint

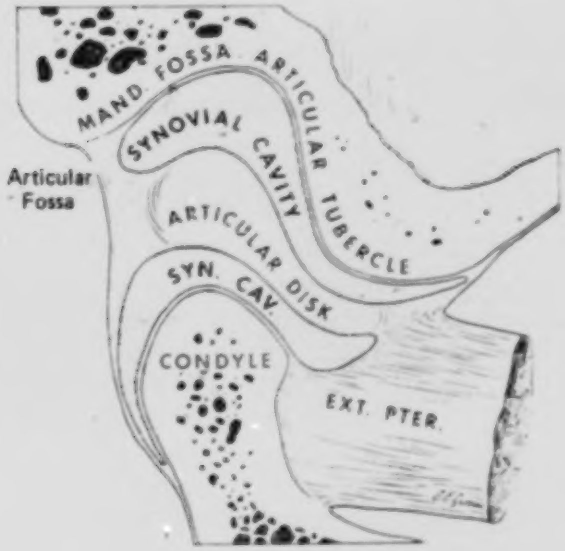
1. **Mandibular condyle.** – The mandibular condyle is located on the superior surface of the head of the condyloid process of the mandible.



Lateral aspect of mandible and part of cranium. The temporomandibular joint is here enclosed in the fibrous capsule, reinforced by the temporomandibular ligament (lateral ligament) (From *Gray's Anatomy of the Human Body,* 29th Ed., C. M. Goss, Editor, p. 293, Philadelphia, Lea & Febiger, 1973).

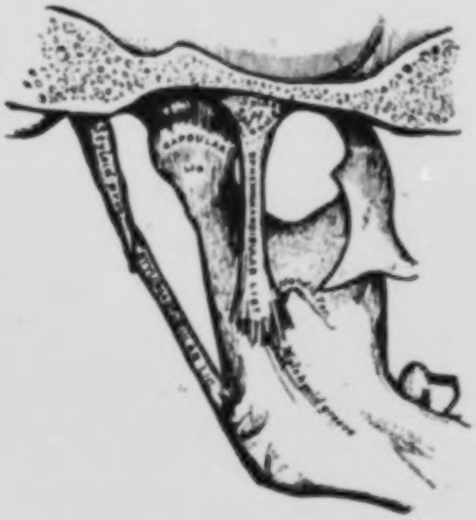
This area is composed of fibrous connective tissue. Again, you must try to visualize this area on the skull, as the tissue will not be available. The stylomandibular and sphenomandibular ligaments (see next page) function to prevent any damage in joint movement.

2. **Articular fossa and articular eminence** – The articular fossa can be found on the undersurface of the skull. The articular fossa is the anterior part of the mandibular fossa. The articular eminence is a ridge that extends medially from the articular tubercle.


MAND. FOSSA
ARTICULAR TUBERCLE
SYNOVIAL CAVITY
Articular Fossa
ARTICULAR DISK
SYN. CAV.
CONDYLE
EXT. PTER.

Temporomandibular Joint

3. **Disc.** – The articular disc consists of dense, fibrous connective tissue. It is located superior to the mandibular condyle and inferior to the articular eminence. It cushions the mandibular condyle preventing it from hitting the temporal bone. As seen in the above illustration, the disc conforms to the articular tubercle area and also to the mandibular condyle area.


Styloid proc.
CAPSULAR LIG.

The temporomandibular joint is enclosed in a sheet of fibrous tissue referred to as the **fibrous capsule**, which is composed of two layers. The inner layer, called the synovial membrane, secretes a fluid, or synovia, which lubricates the joint. The outer layer reinforces and strengthens the joint by use of **accessory ligaments**.

As we saw in the previous section, the muscles which move the joint are the muscles of mastication:

1. Masseter muscles
2. Temporal muscles
3. Internal (medial) pterygoid muscles
4. External (lateral) ptergoid muscles

Objectives:

1. List the four major arteries of the head and neck.
2. Given an illustration, locate and identify the four major arteries of the head and neck.
3. Given a skull diagram, designate where the following arteries are found:

    occipital
    mental
    superior thyroid
    anterior superior alveolar
    middle superior alveolar
    posterior superior alveolar
    infraorbital
    inferior alveolar

Equipment:

Laboratory sheets
Anatomical skulls
Reference textbooks

Referring to the diagram on the next page, follow the pathways of these arteries:

External Carotid Artery

Superficial, i.e., situated near the surface of the head.
Branches off into other arteries to serve many areas of the head, namely the throat, tongue, face, ears.

Lingual Artery

A major branch of the external carotid artery, situated deep in the neck to supply the tongue.

Facial Artery (External maxillary artery)

Another major branch of the external carotid artery, situated anterior to the external carotid and a short distance above the lingual artery.

Superficial Temporal Artery

A third major branch of the external carotid artery, situated superior to the external carotid artery. Supplies the frontal and parietal areas.

Other important arteries include the following. They will be discussed in class.

occipital artery

superior thyroid artery

inferior alveolar artery

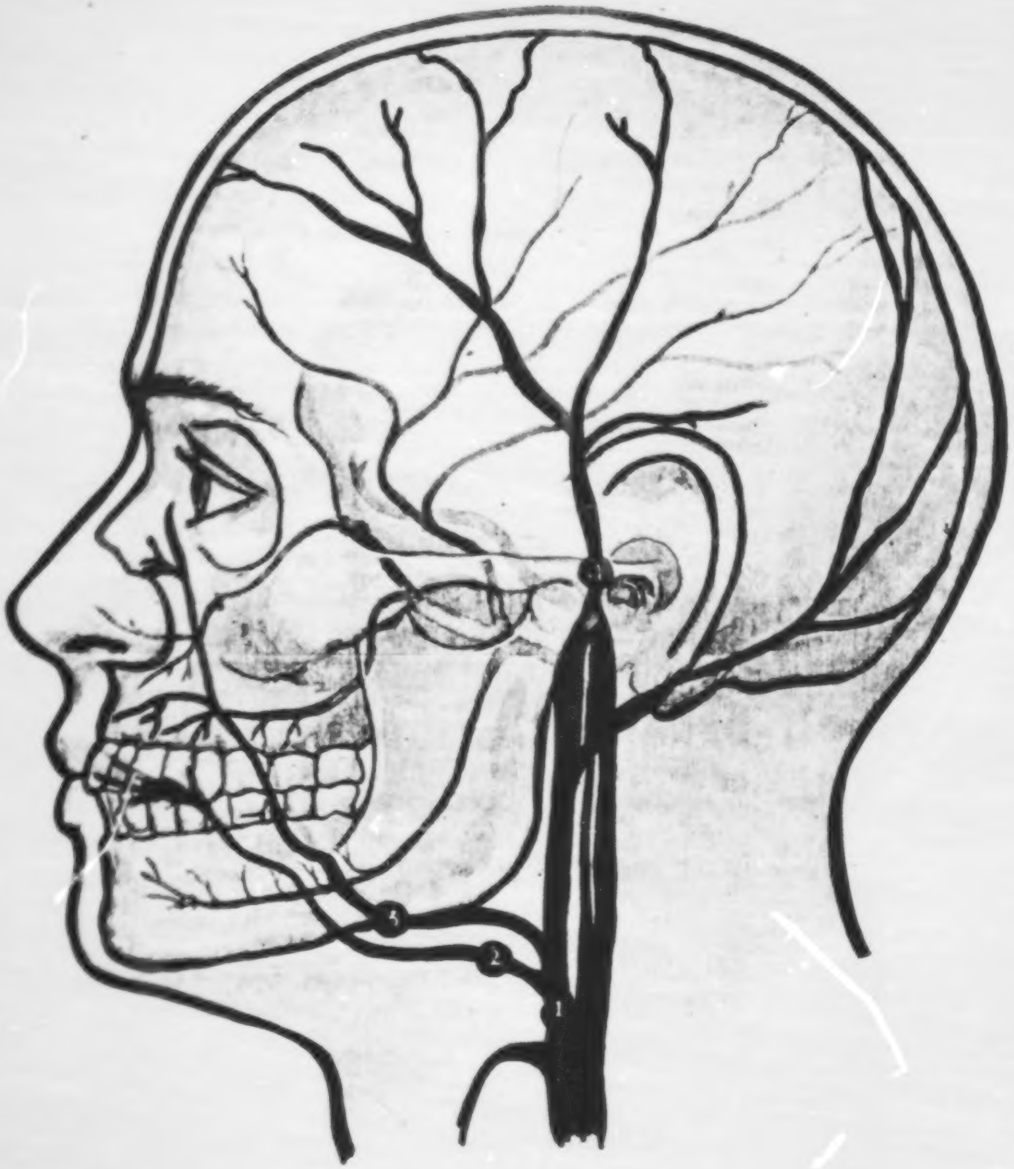
posterior superior alveolar artery

middle superior alveolar artery

anterior superior alveolar artery

mental artery

infraorbital



Arteries of the Head

Laboratory Exercise – Major Arteries of the Head and Neck

Name ______________________________ Date ________________

1. What artery supplies the maxillary central incisors? ____________________
2. What artery supplies the maxillary second molars? ____________________
3. What artery supplies the mandibular central incisors? ____________________
4. Arterial supply to the inferior border of the orbits is accomplished by what artery?

   ____

5. The artery which supplies the tongue is named ____________________.
6. The largest and most superior branch of the external carotid artery is

   ____

7. What distinguishes blood coming from an artery as compared to a vein?

   ____

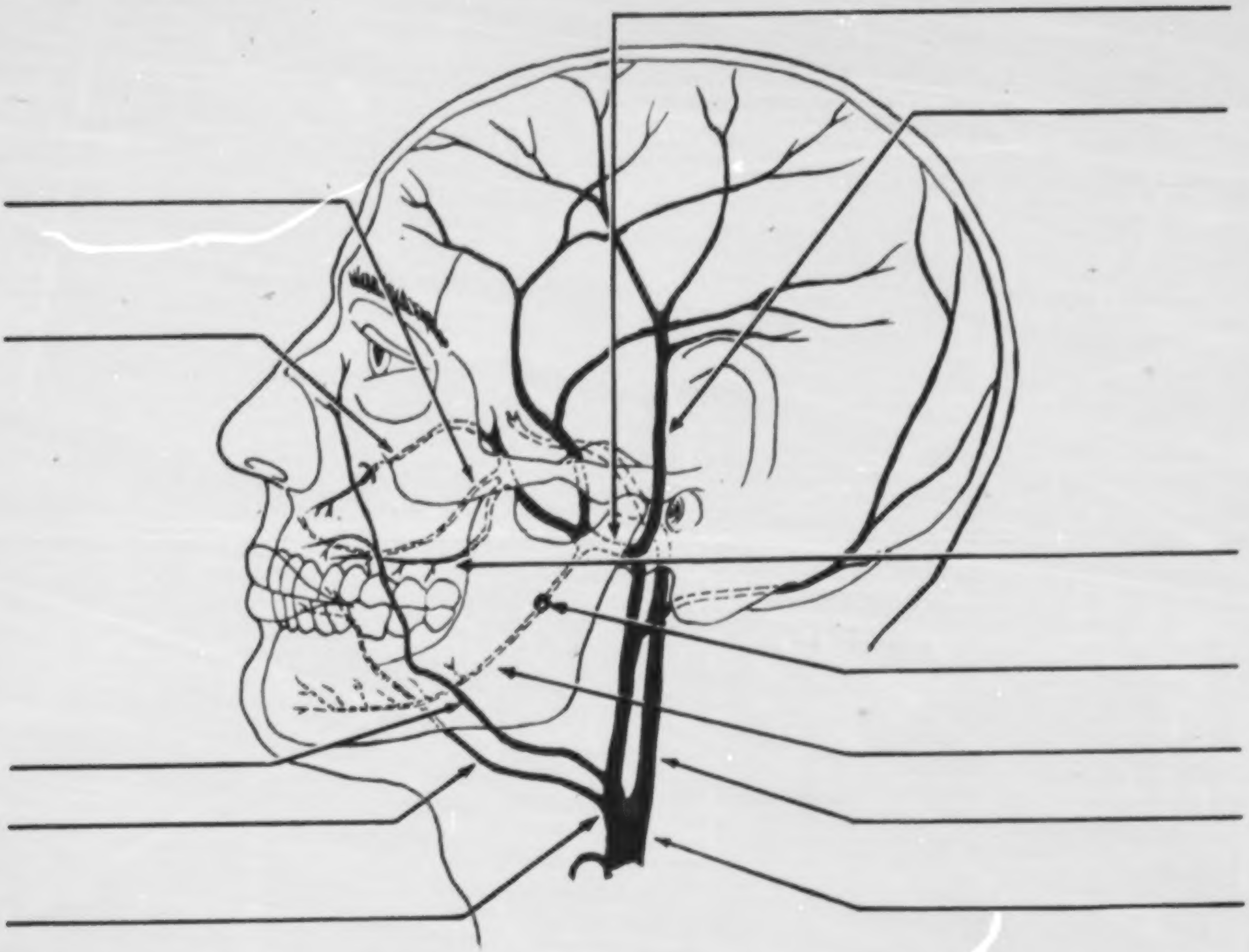
   ____

8. Matching:

   _____ tongue
   _____ chin
   _____ maxillary anterior teeth
   _____ mandibular anterior teeth
   _____ entire head

   a. anterior superior alveolar artery
   b. common carotid artery
   c. lingual artery
   d. mental artery
   e. inferior alveolar artery

9. Complete the following illustration:



Topic 11 Major Veins of the Head and Neck

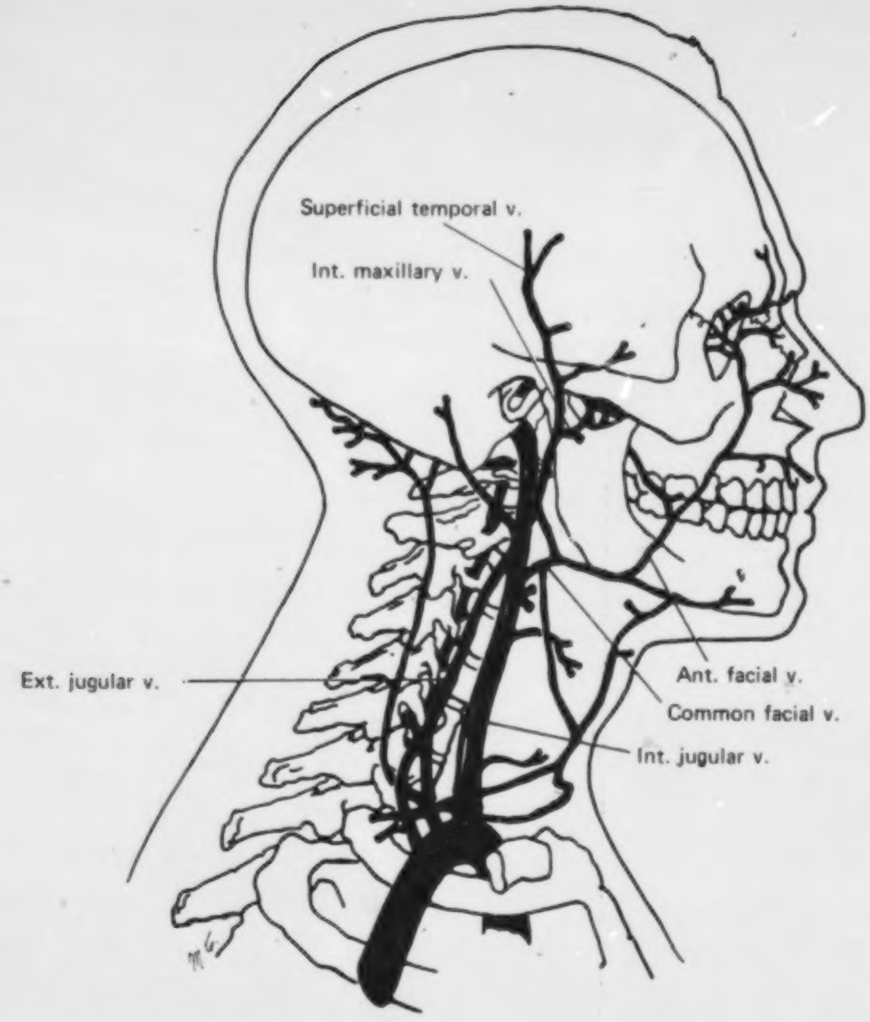
Objectives:

1. List four of the five major veins of the head and neck.
2. Given a skull diagram or other cranial illustration, locate and name the following veins:

    facial (anterior, common)
    superficial temporal
    internal maxillary
    internal jugular
    external jugular

Equipment:

Laboratory sheets
Anatomical skulls
Reference textbooks


Superficial temporal v.
Int. maxillary v.
Ext. jugular v.
Ant. facial v.
Common facial v.
Int. jugular v.
MG

The veins of the head and neck

Follow the pathways of the veins as illustrated on the previous page:

Internal Jugular

Runs parallel to the common carotid artery.

Collects blood from the brain, eyes, and superficial parts of the head and neck.

External Jugular

Located posterior and superficial to the internal jugular vein.

Collects blood from the exterior of the skull and deep parts of the face and neck.

Facial Vein

Divided into areas and named according to the area where found

a. anterior facial vein – downward and across face

b. common facial vein – angle of the mandible

It is a branch of the internal jugular vein.

Superficial Temporal

Another branch of the external jugular vein, anterior to external auditory meatus.

Brings blood to the superficial tissue of the skull.

Internal Maxillary

A third branch of the external jugular vein, inferior to the superficial temporal vein.

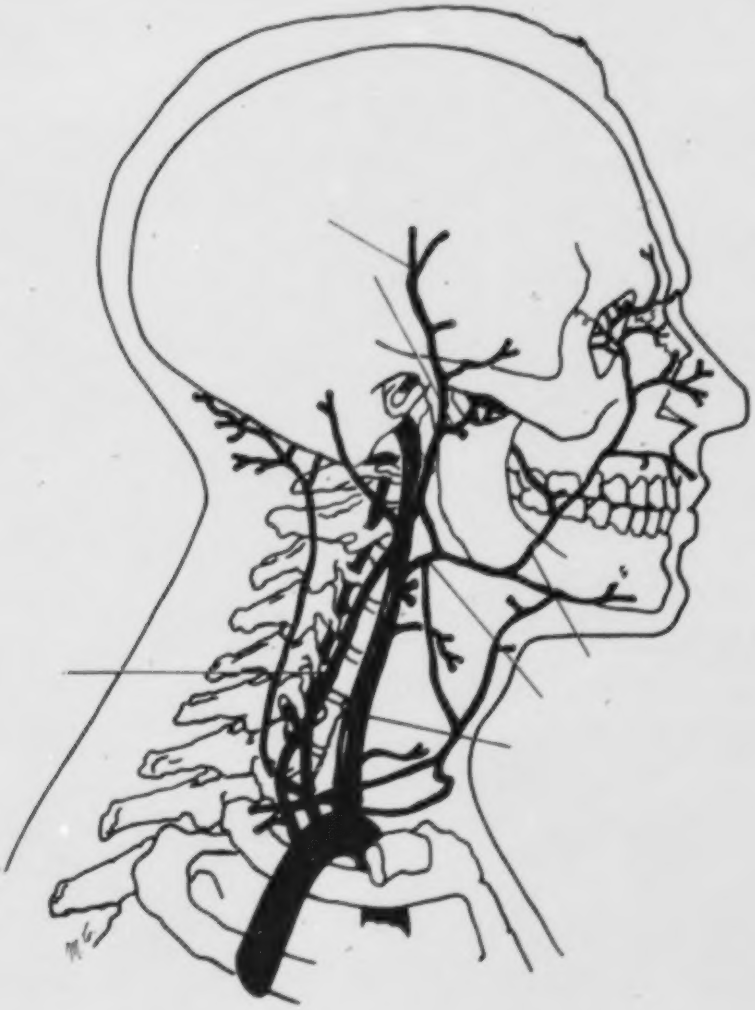
Other important veins (not shown in illustration) include the following. They will be discussed in class.

occipital
mental
angular
deep facial

Laboratory Exercise – Veins of the Head and Neck

Name ______________________________ Date ______________

1. The facial vein carries blood from what large vein? ______________
2. Another name for retromandibular vein is ______________
3. What vein carries blood away from the mandibular teeth? ______________
4. What vein carries blood away from the maxillary teeth? ______________
5. What large vein runs parallel to the common carotid artery? ______________
6. On the diagram below, fill in the names of the veins marked with arrows.



Introduction:

"Innervation" means supplying with nerves. Nerves associated with the head and neck are referred to as cranial nerves. There are 12 pairs of cranial nerves all of which innervate from the under-surface of the brain. Only two cranial nerves are directly related to dental structures: the fifth cranial nerve, referred to as the **trigeminal nerve**, and the seventh cranial nerve, referred to as the **facial nerve**. This laboratory unit will be concerned only with the fifth or trigeminal nerve.

The twelve pairs of cranial nerves are of three types: **sensory** (concerned only with transmitting sensation), **motor** (concerned with the movement of muscles), and **mixed** (those nerves containing both sensory and motor nerve fibers.) Each of the 12 cranial nerves comes in pairs, one right, one left.

The dental assistant should become very familiar with the innervation of the trigeminal nerve, as its divisions are involved in most anesthetic injections. "Anesthesia" literally means loss of sensation – awareness of pressure, pain, and/or temperature. Anesthesia is administered only by persons thoroughly knowledgeable in the fields of pharmacology, physiology, anatomy, and first aid. Although the dental assistant does not administer anesthesia, she/he should be familiar with the injection sites, nerves innervated by these sites, and how anesthesia occurs. This laboratory session will include nerve innervation; administration of anesthesia is covered separately.

Objectives:

1. List the three large divisions of the trigeminal nerve.
2. Given an illustration, locate and identify those components of the trigeminal nerve.
3. List the 12 cranial nerves and state the type of each.
4. Given a division of the trigeminal cranial nerve, state what teeth are innervated by this specific division.

Equipment:

Additional reference textbooks
Laboratory worksheets
Anatomical skulls (optional)

The Twelve Cranial Nerves

Nerve	Type
1. Olfactory	Sensory
2. Optic	Sensory
3. Oculomotor	Motor
4. Trochlear	Mixed
5. Trigeminal	Mixed
6. Abducens	Mixed
7. Facial	Mixed
8. Acoustic	Sensory
9. Glossopharyngeal	Mixed
10. Vagus	Mixed
11. Spinal Accessory	Mixed
12. Hypoglossal	Mixed

The Trigeminal Nerve

The trigeminal nerve is the largest of the 12 cranial nerves. Follow its many pathways on the diagrams included in this section. It is suggested that you color each division on the illustration for the sake of clarity.

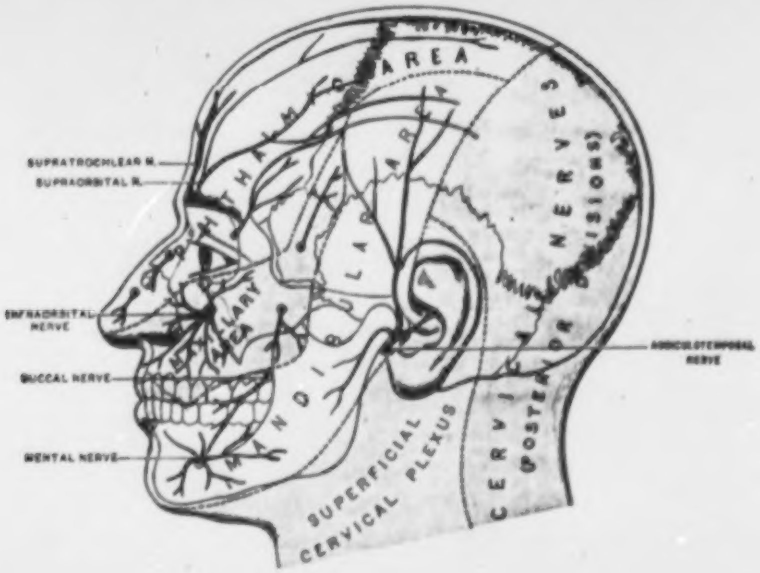

SUPRATROCHLEAR N.
SUPRAORBITAL N.
INFRAORBITAL NERVE
BUCCAL NERVE
MENTAL NERVE
AURICULOTEMPORAL NERVE
OPHTHALMIC AREA
MAXILLARY AREA
MANDIBULAR AREA
SUPERFICIAL CERVICAL PLEXUS
CERVICAL NERVES (POSTERIOR DIVISIONS)

Diagram of the general distribution of the 3 divisions of the trigeminal nerve (From *Gray's Anatomy of the Human Body*, 29th Ed., C.M. Goss, Editor, p. 918, Philadelphia, Lea & Febiger, 1973).

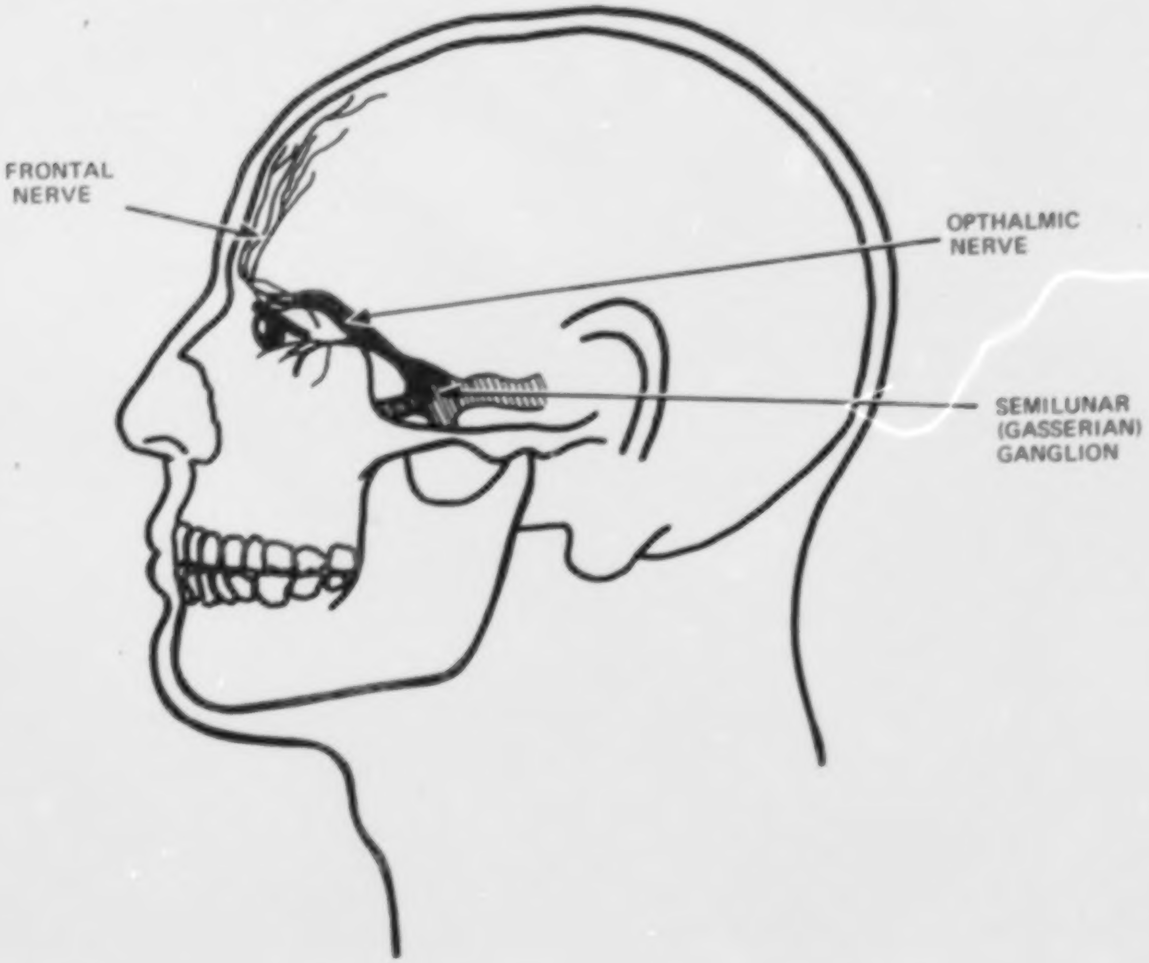
Division I of the Trigeminal Nerve

The opthalmic nerve is the first division of the trigeminal nerve. This division does not supply the oral cavity. It innervates the eyeball, upper eyelid, skin of the nose, forehead, and scalp, and the lacrimal glands.

The opthalmic nerve is the smallest branch of the trigeminal nerve.

The frontal nerve is the largest branch of the opthalmic division. As it passes through the superior orbital fissure it divides into the **supraorbital** and **supratrochlear** nerves.

As mentioned above, the opthalmic division of the trigeminal nerve has no involvement with dental structures.



First (Opthalmic) Division of Trigeminal Nerve

Division II of the Trigeminal Nerve

The maxillary nerve is the second division of the trigeminal nerve. This division has four major branches:

1. Sphenopalatine nerve

   This branch is the closest to the origin of the maxillary nerve.

2. Infraorbital nerve

   This is the largest branch of the maxillary nerve. It passes along the infraorbital canal and emerges through the infraorbital foramen. Three additional nerves branch off the infraorbital nerve; they are the superior alveolar nerves.

3. Alveolar nerves

   a. Anterior superior alveolar nerve

      Supplies the maxillary central and lateral incisors and cuspids.

      Supplies the periodontal membrane and surrounding gingiva within this anterior region.

   b. Middle superior alveolar nerve

      Supplies the maxillary first and second bicuspids and the mesiobuccal root of the maxillary first molar.

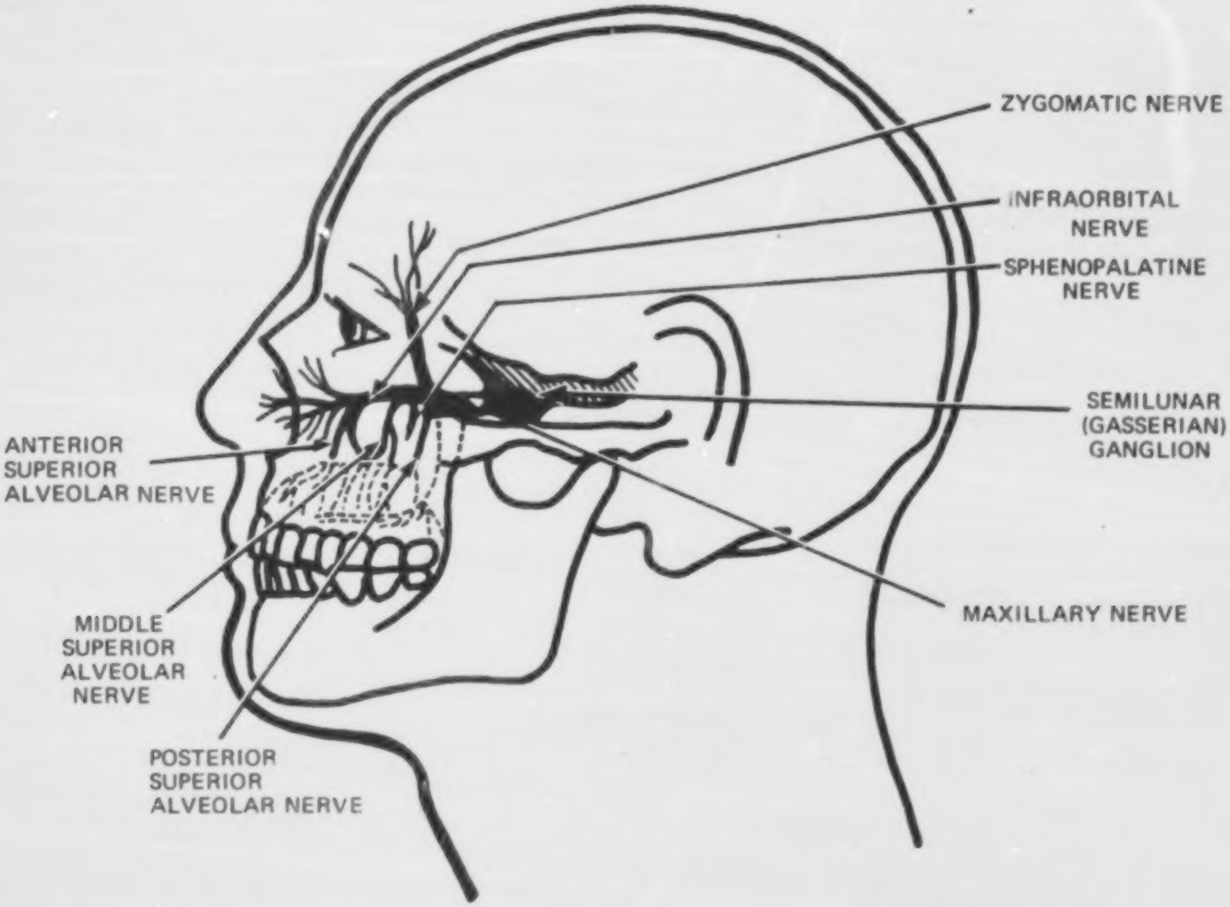
      Supplies the periodontal membrane and surrounding gingiva within this middle region.

   c. Posterior superior alveolar nerve

      Supplies the distobuccal and lingual roots of the maxillary first molar, and all the roots of both the second and third maxillary molars.

4. Zygomatic nerve:

   Passes through the zygomatic bone and innervates the tissues surrounding the zygomaticotemporal area.


ZYGOMATIC NERVE
INFRAORBITAL NERVE
SPHENOPALATINE NERVE
SEMILUNAR (GASSERIAN) GANGLION
ANTERIOR SUPERIOR ALVEOLAR NERVE
MAXILLARY NERVE
MIDDLE SUPERIOR ALVEOLAR NERVE
POSTERIOR SUPERIOR ALVEOLAR NERVE

Second (Maxillary) Division of Trigiminal Nerve

Division III of the Trigeminal Nerve

The mandibular nerve is the third division of the trigeminal nerve. This division is the largest branch of the trigeminal nerve and has many smaller branches. The mandibular nerve supplies the muscles of mastication, the skin around the temporal area, the teeth and gingiva of the mandible, the lower lip, and the anterior two-thirds of the tongue.

1. Buccal nerve

   Passes along the cheek side of the mouth, through the buccinator muscle; however, does not supply it in any way.

   Innervates the buccal area of the bicuspids and molars.

2. Lingual nerve

   Branches off the mandibular nerve posterior to buccal nerve. Passes downward through the lingual surface of the mandible.

   Innervates the sublingual and tongue glands (involuntary nerve impulses), the lateral surfaces of the tongue (responses of taste and touch), and the superior surface of the tongue.

3. Inferior alveolar nerve

   Largest branch of the mandibular nerve.

   Supplies branches to all teeth on one side of the mandible.

   Divides into three additional branches:

   a. Mylohyoid nerve – Passes into the mandibular foramen and follows along the mandibular canal.

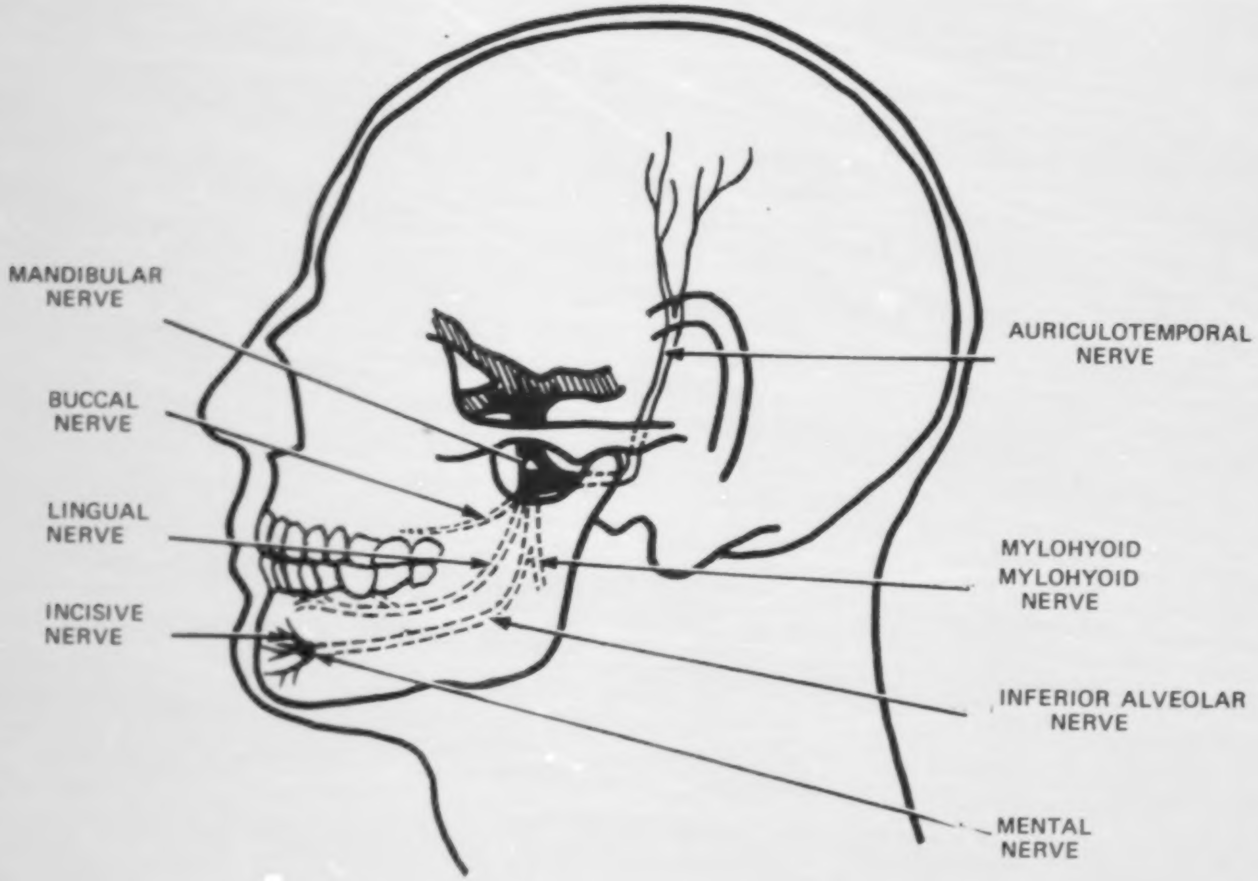
   b. Mental nerve – Passes through the mental foramen and innervates chin and lower lip

   c. Incisive nerve – Passes through mental foramen and innervates the mandibular anterior teeth

4. Auriculotemporal nerve

   Supplies the lateral surface of the skull anterior to the auditory meatus and superior to the temporal bone.

   Has no dental orientation.


MANDIBULAR NERVE
BUCCAL NERVE
LINGUAL NERVE
INCISIVE NERVE
AURICULOTEMPORAL NERVE
MYLOHYOID
MYLOHYOID NERVE
INFERIOR ALVEOLAR NERVE
MENTAL NERVE

Third (Mandibular) Division of Trigeminal Nerve

Laboratory Exercise – Nerve Innervation of the Head and Neck

Name ______________________________ Date ____________

1. The most important of all the cranial nerves from the dental point of view is the ____________________.

2. Those cranial nerves concerned with the movement of muscles are classified as ____________ nerves.

3. Those cranial nerves concerned with transmitting sensation are referred to as ______________ nerves.

Give the type of cranial nerve each of the following is:

Cranial Nerve	Type
4. Facial	
5. Trigeminal	
6. Optic	
7. Ninth cranial nerve	
8. Eleventh cranial nerve	
9. Twelfth cranial nerve	

10. The third division of the trigeminal nerve is referred to as the ______________ division.

11. What teeth are innervated by the posterior superior alveolar nerve?

    ____

12. What teeth are innervated by the anterior superior alveolar nerve?

    ____

13. What teeth are innervated by the buccal nerve?

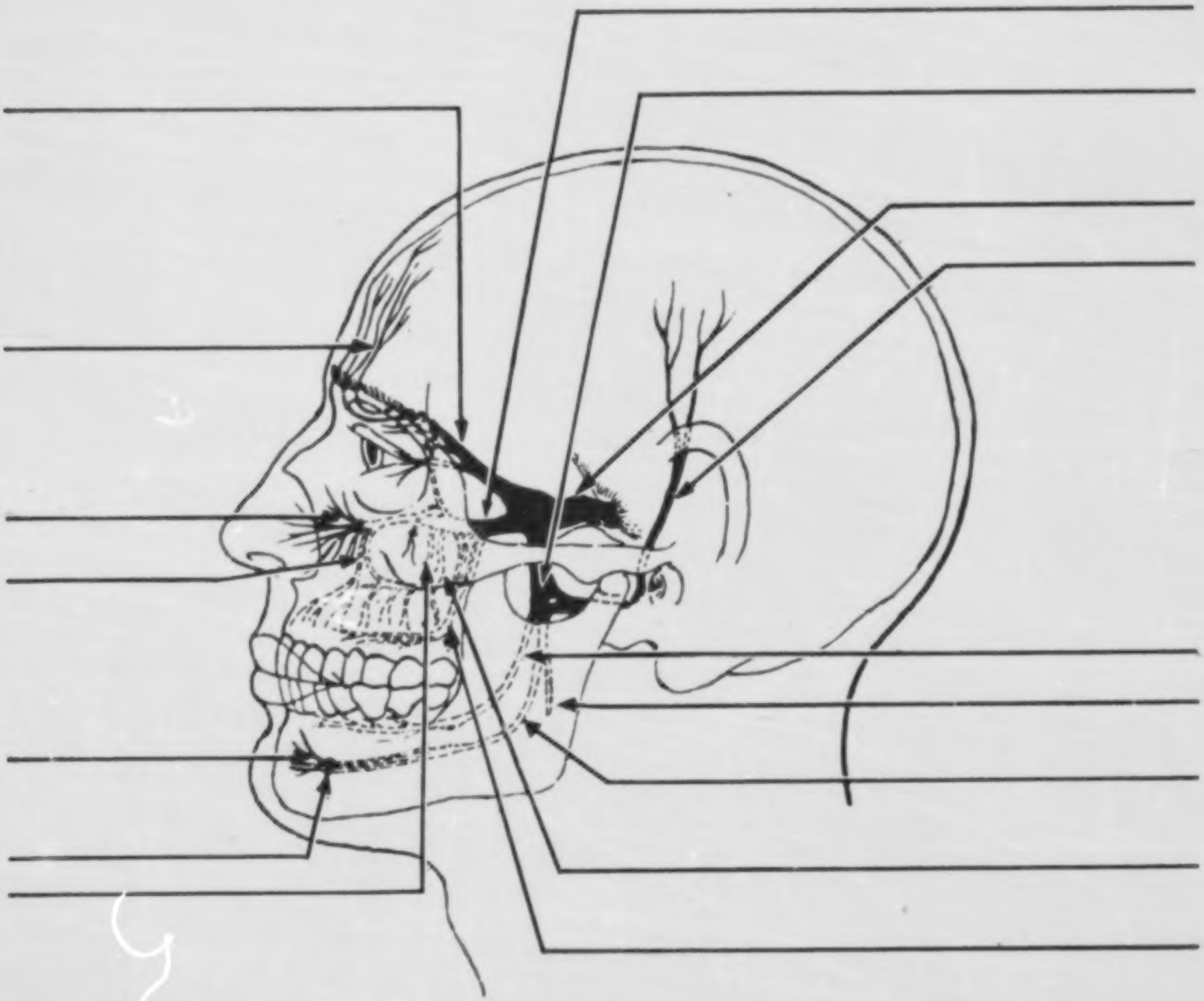
    ____

14. The largest branch of the maxillary nerve is the ____________________ nerve.

15. The opthalamic nerve is referred to as the ______________ division of the trigeminal nerve.

16. The largest branch of the trigeminal nerve is the ____________________ division.

17. Complete the diagram by filling in the blanks:



Introduction:

Numerous salivary glands can be found within the oral cavity. These glands are referred to as **serous** (meaning they secrete serum, a clear fluid); **mucous**, (meaning they secrete mucin, a tenacious fluid); or **mixed** (secreting both serum and mucin).

Saliva, which includes all secretions by these glands, consists of approximately 99.5% water. The other 0.5% consists of digestive enzymes, other proteins, and inorganic salts. The pH of saliva is about 6.4 to 7.0, making it almost neutral.

Salivary flow tests are completed on dental patients who are receiving a preventive dentistry program. It is thought that saliva having a higher pH and greater volume tends to increase calculus formation and caries production. Over a 24-hour period an adult averages 1.5 – 2.0 liters of salivary secretion.

Objectives:

1. Given an illustration of the major salivary glands, label each correctly.
2. List the three major salivary glands.
3. Describe in writing the difference between a gland and a duct.
4. Name the duct associated with the parotid gland.
5. Give another name for the submandibular duct.
6. List three minor salivary glands.

Equipment:

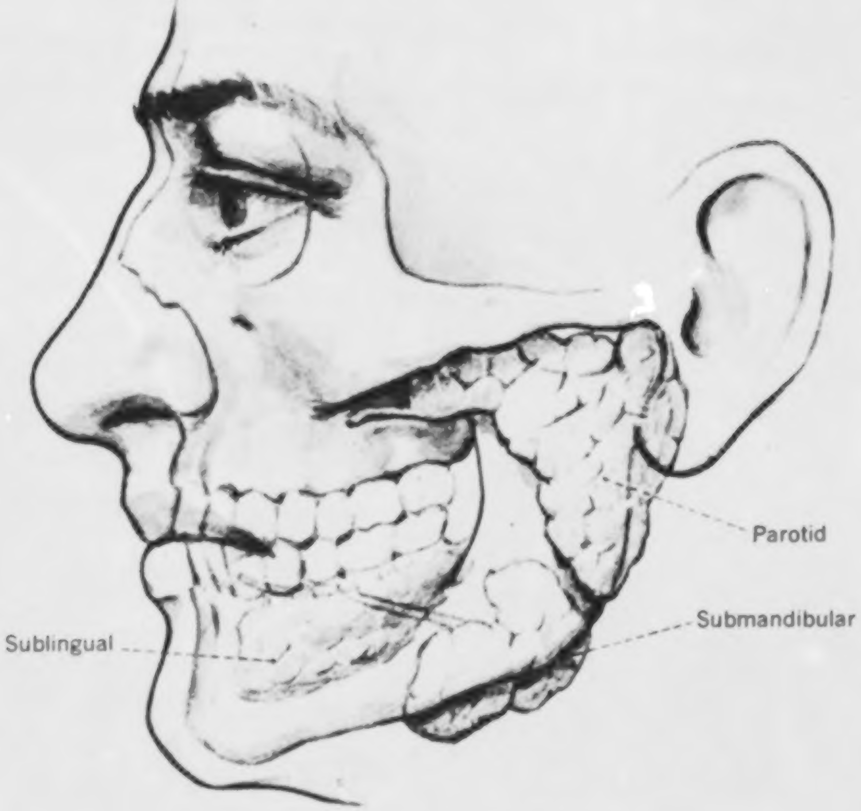
Reference textbooks
Exercise sheet

THE SALIVARY GLANDS

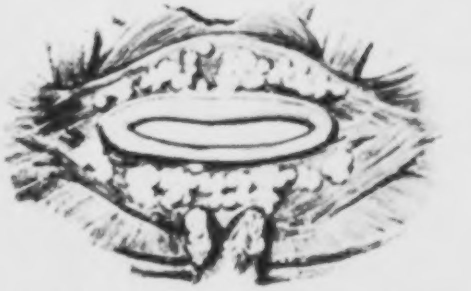
Salivary glands are found throughout the oral cavity except on the alveolar process, in the anterior portion of the palate and at the occlusal level of the cheek. In certain areas these glands are grouped into large-sized major glands.

				Secretion	
Glands	*Location*	*Excretory Ducts*	*Type*	*Function*	*Stimulus*
Parotid	On lateral aspect of mandibular ramus in front of ear and in retro-mandibular fossa; largest gland	Stenson's duct; opens on a teat-like projection opposite upper second molar	Almost entirely serous (ptyalin); clear and watery secretion	Cleansing; dissolving; digestive	Sour (Lemon)
Submandibular	On inner aspect of mandible reaching below the hyoid bone; mixed gland	Wharton's duct; opens on sublingual caruncle	Mixed; mostly serous; thin at first, later thicker	Lubricative; digestive	?
Sublingual	Composite gland consisting of the major and several minor sublingual glands In floor of mouth next to body of mandible; smallest major gland	Bartholin's duct draining the major sublingual gland, opens on sublingual caruncle; several Rivinian ducts from the minor sublingual glands open on the plica sublingualis	Mostly mucous (mucilaginous and ropey)	Lubricative	Bland substances (milk, bread)
Minor Glands					
Labial	Lips		Mucous and serous		
Buccal	Cheeks		Mucous and serous		
Palatal	Palate		Mucous		
Lingual	Tongue		Mucous and serous		

Reference: Orban, B. J. (Editor): Oral Histology and Embryology. Ed. 4. St. Louis: C. V. Mosby Co., 1957.

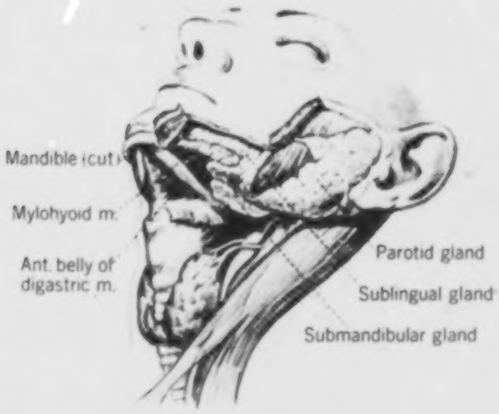

Parotid
Submandibular
Sublingual

MAJOR SALIVARY GLANDS



Labial glands (viewed from inside)

MINOR SALIVARY GLANDS


Mandible (cut)
Mylohyoid m.
Ant. belly of digastric m.
Parotid gland
Sublingual gland
Submandibular gland

Laboratory Exercise – Salivary Glands

Name ______________________________ Date __________

Complete the following:

1. The largest of the major salivary glands is the ____________________.
2. Wharton's duct is that duct which is connected to the ____________________ salivary gland.
3. The duct connected to the parotid gland is the ____________________ duct.
4. The ______________ salivary gland is the smallest of the major salivary glands.

List two functions of the salivary glands:

5. ______________________________
6. ______________________________

List three minor salivary glands:

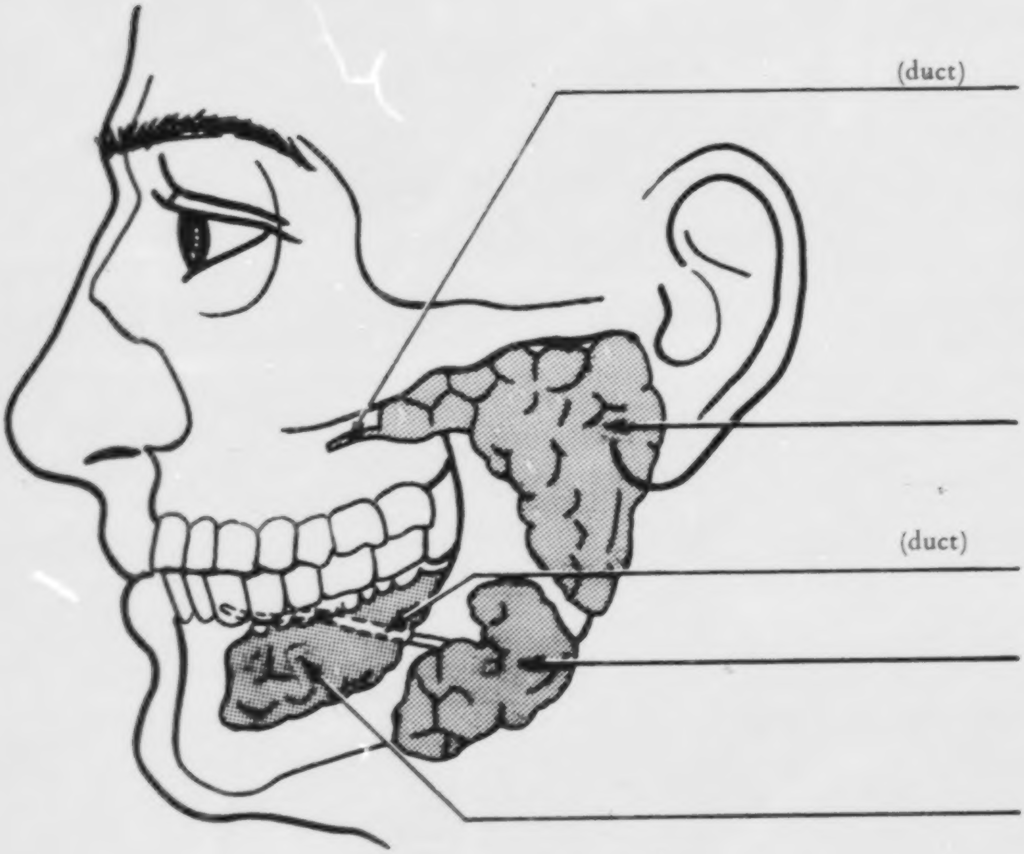
7. ____________________
8. ____________________
9. ____________________

Matching:

10. _____ duct
11. _____ Wharton's
12. _____ buccal
13. _____ Stetson's
14. _____ salivary amylase or ptyalin
15. _____ gland

a. minor salivary gland
b. duct from parotid salivary gland
c. passage for fluid
d. "holding" area for secretions
e. duct from submandibular gland
f. enzyme found within saliva

16. Complete the following illustration by placing the correct terms on the lines provided:



Objectives:

1. Given a complete adult typodont, list each tooth found within an arch in order (anterior to posterior).
2. Given a complete adult typodont, differentiate the mandible from the maxillae.
3. Define antagonists as related to dental morphology and name those teeth that do not have the usual number of antagonists.
4. Given any extracted adult tooth, identify it as to its name and location in the mouth.
5. List the adult anterior human dentition.
6. List the adult posterior human dentition.
7. Given a diagram of an adult tooth, label correctly the surfaces of the tooth.
8. Define line and point angle.
9. Given a diagram of an adult tooth, correctly label its division into thirds.
10. Given any quadrant in the human dentition, list the teeth found within it.
11. Given any tooth found in an adult dentition, list the line angles and/or point angles of that tooth.
12. List the embrasures of the teeth.

Equipment:

Adult typondonts (non-anatomical roots)
Removable-tooth typodonts (anatomical roots)
Human extracted teeth

Morphology is the study of form and structure.

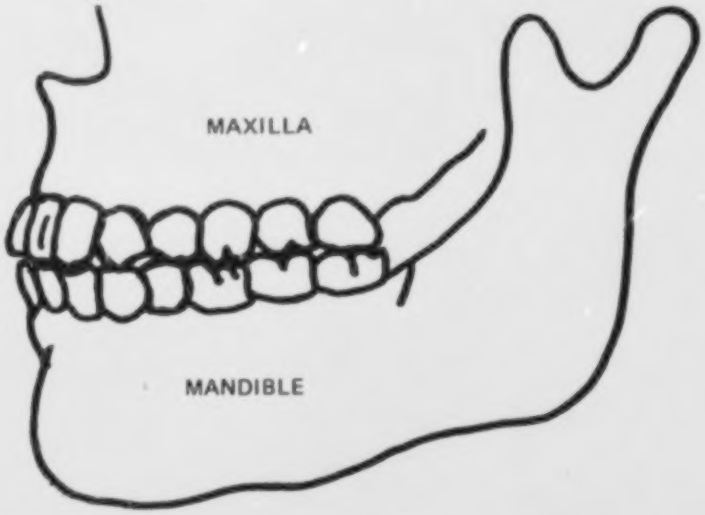
I. The Dental Arches

The teeth are *alined* (positioned or arranged) in two dental arches:

In the maxillae, the upper jaw
In the mandible, the lower jaw

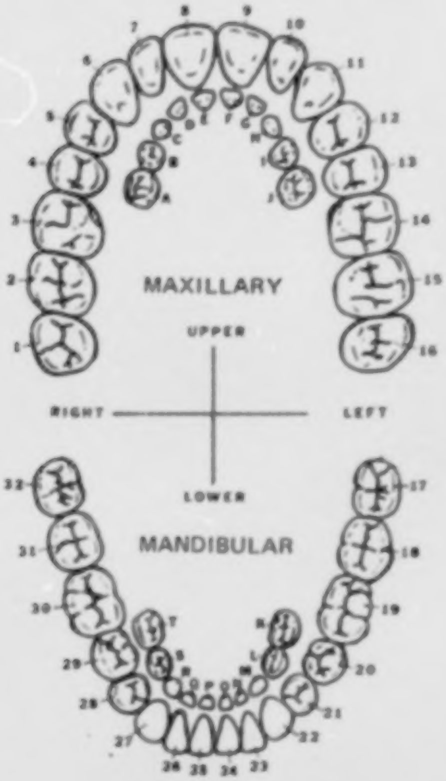
The mandibular arch, which is movable, operates against the maxillary arch, which is fixed, during jaw movements.

In the study of the teeth in their structural and occlusal relationships, it is important to realize that the movable mandibular arch brings the primary forces of occlusion to bear on the immovable maxillary arch.



The maxillae and the mandible contain the same number and types of teeth; however, there are certain distinct differences between the teeth of the two jaws.

One of the most pronounced differences is in the mesiodistal width between the upper and lower anterior teeth. The normal relationship between the upper and lower teeth results in a horizontal and vertical overlap of the upper teeth over the lower. This results in a wider arch for the maxillary teeth to fill. It particularly affects the anterior teeth because of the greater curvature of the anterior part of the dental arch (there is little or no lateral curvature in the posterior part).


MAXILLARY
UPPER
RIGHT
LEFT
LOWER
MANDIBULAR
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T

Some of the other more pronounced differences include differences in the numbers of roots of molars, in the configuration and the outline form of occlusal surfaces. Spacing between the roots of one tooth and those of adjacent teeth allows sufficient bone tissue for a foundation or investment for the teeth and supporting structure required to hold gingival tissue up to a normal level. Also sufficient circulation of blood to the parts would be impossible without this spacing.

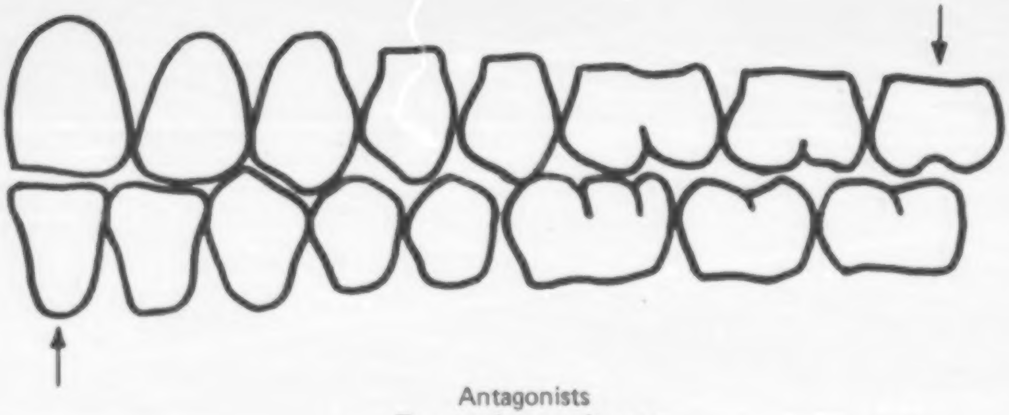
Antagonists

Each tooth in the dental arch has two antagonists in the opposing arch. The only exceptions are the **mandibular central incisors** and the **maxillary third molars**, marked with arrows in the illustration below.

In the mandible a tooth is situated more mesially and lingually than its counterpart in the maxillae.

Each mandibular tooth (in the intercuspal position) contacts two maxillary teeth - its class counterpart and the tooth immediately mesial to it (with the exception of the centrals).

In the event of loss of any tooth, this arrangement tends to prevent elongation of antagonists and helps to stabilize the remaining teeth over a longer period than would be likely if each tooth had a single antagonist.



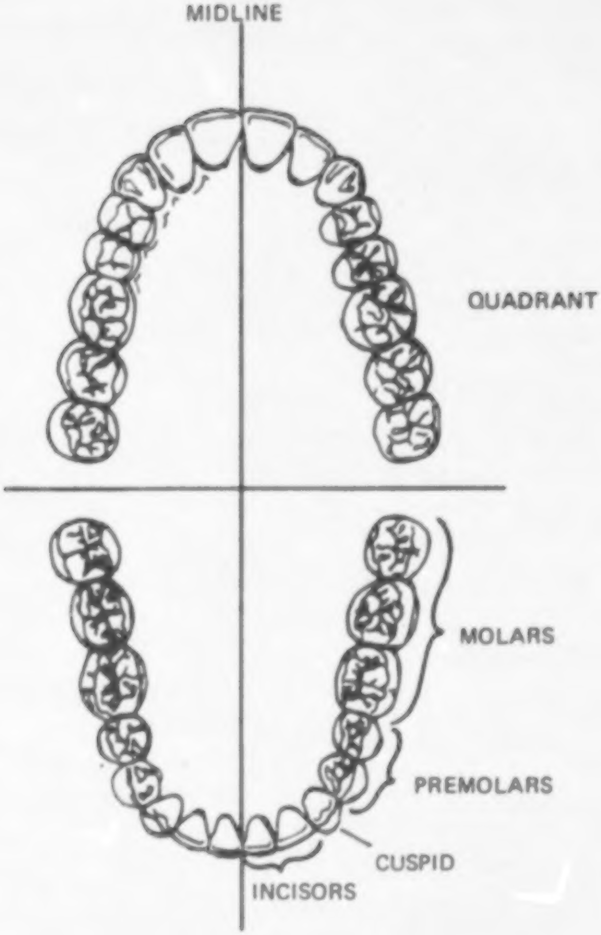
Antagonists
Two teeth opposite one

Quadrants

The midline divides each jaw into mirror halves. Two jaws, each divided into half, creates four sections. Thus the teeth are described as being in four **quadrants.**

A complete set of permanent teeth includes 16 teeth in each jaw. Each of the four quadrants contains eight teeth:

2 incisors
1 cuspid
2 premolars
3 molars


MIDLINE
QUADRANT
MOLARS
PREMOLARS
CUSPID
INCISORS

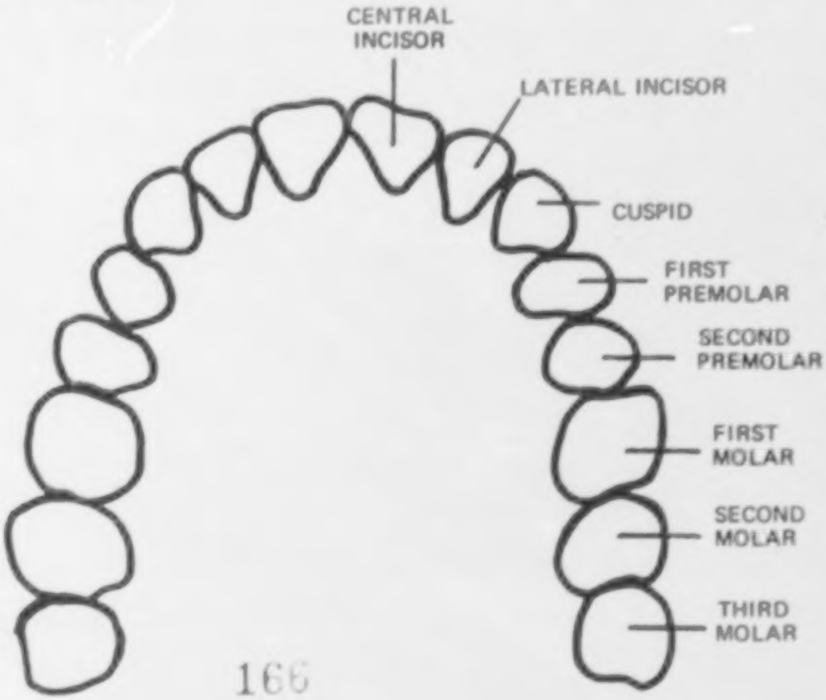
II. The Types of Teeth

The design of the teeth is a reflection of our eating habits. Man is *omnivorous.* This means that he eats everything, both animal flesh and plants.

In order to accommodate the variety in his diet, man's teeth are formed for *cutting, tearing,* and *grinding.*

On the basis of form and function, the human teeth of the permanent dentition fall into four classes:

Incisors	Incisors have relatively sharp and thin edges and are designed for cutting. They are able to cut food without the application of heavy force.
Canine	The canine, or cuspid, with its thicker enamel and longer root, is designed for cutting and tearing. The crown of the canine is more massive than that of the incisors, and its root is the longest in the dentition.
Premolars	These teeth, which are also known as bicuspids, are like the canines in that they have points and cusps for grasping and tearing. They also have a somewhat broader working surface for pulverizing food.
Molars	The cusps of the molars, although shorter and blunter than those of the other teeth, are greater in number, thus producing a broad working surface for grinding the more solid masses of food which require the application of heavy force. Their multiple root structure is designed to support the larger crown mass. (Maxillary molars have three roots; mandibular molars have two roots.)

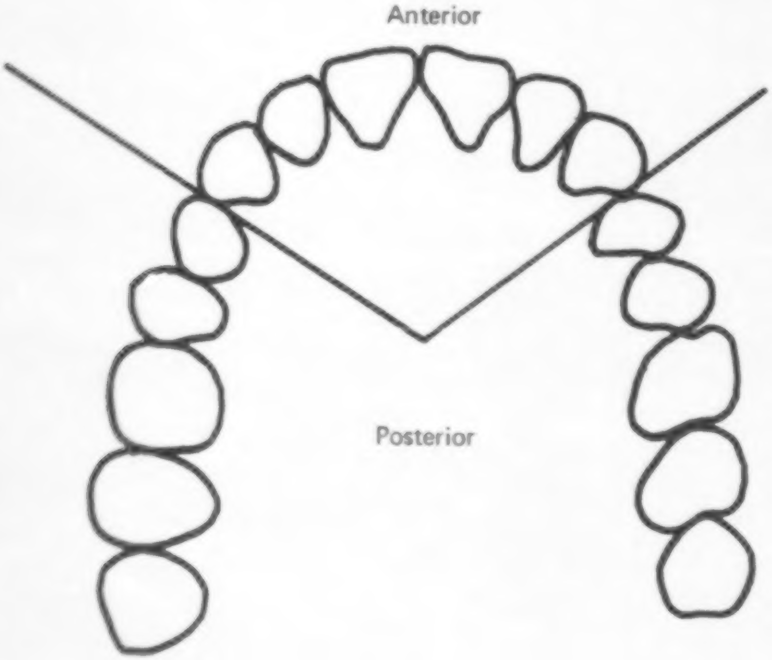


III. Anterior and Posterior Teeth

As an aid in describing the type and location of the teeth, they are classified as anterior and posterior teeth.

Anterior teeth: the incisors
the canines

Posterior teeth: the premolars
the molars



Anterior teeth, as a group, are characterized by having single roots and incisal edges or single cusped crowns ending in narrow edges. They are designed to incise (bite off) relatively large amounts of food in eating. They are so alined as to form a smooth, curving arch from the distal of the canine on one side of the arch to the distal of the canine on the opposite side.

Posterior teeth may have more than one root. They may have multiple cusps, forming occlusal surfaces designed to crush and grind food into small parts. The part of the dental arch which they form has little or no lateral curvature.

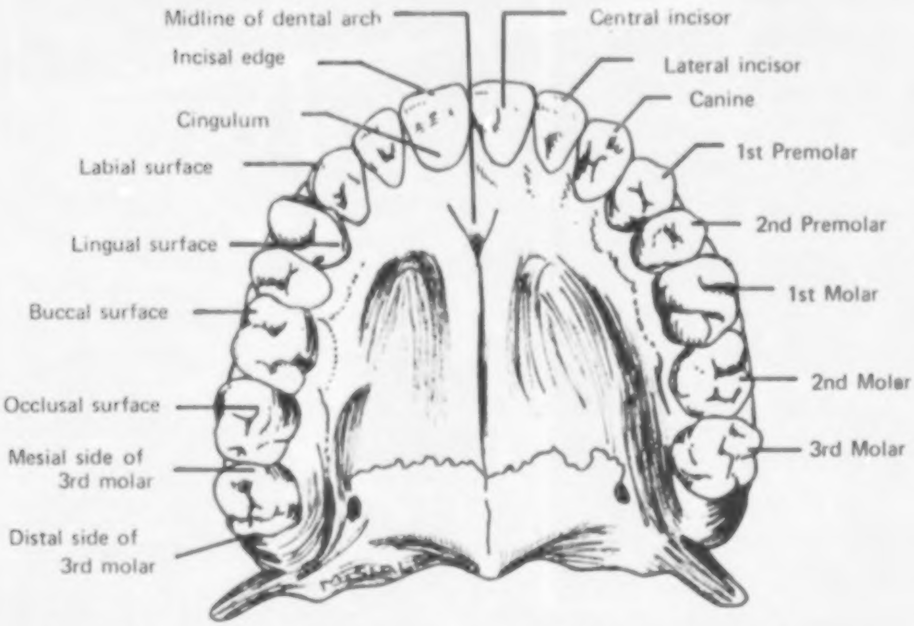
IV. Surfaces and Borders of the Teeth

A. AXIAL SURFACES

Not all surfaces are axial. Each tooth has four axial surfaces. "Axial" refers to an *axis*, which is an imaginary line passing longitudinally through the geometric center of the tooth. An axial surface, then, is a longitudinal surface of a tooth – that is, one of the four visible surfaces *around* the tooth.

The axial surfaces are:

- The lingual surface
- The labial (or buccal) surface
- The mesial surface
- The distal surface


Midline of dental arch
Central incisor
Incisal edge
Lateral incisor
Canine
Cingulum
1st Premolar
Labial surface
2nd Premolar
Lingual surface
1st Molar
Buccal surface
2nd Molar
Occlusal surface
3rd Molar
Mesial side of 3rd molar
Distal side of 3rd molar
MESIAL

Lingual surface – that surface of a tooth which faces toward the tongue.

Labial surface – that surface of an anterior tooth immediately adjacent to the lips.

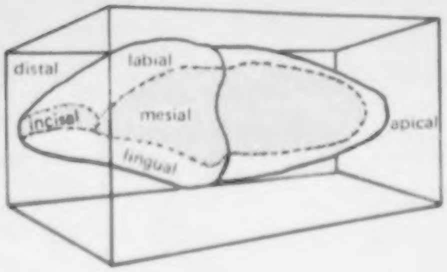
Buccal surface – that surface of a posterior tooth immediately adjacent to the cheek.

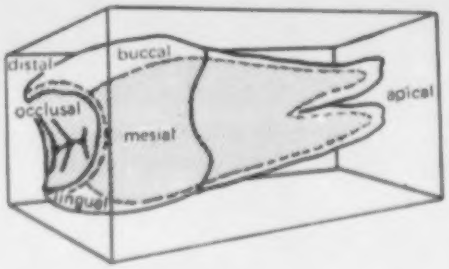
Facial surface – this refers collectively to both labial and buccal surfaces.

Mesial surface – the surface of a tooth facing *toward the midline of the dental arch*, following the curve of the arch.

Distal surface – the surface of a tooth facing *away from the midline of the dental arch*, following the curve of the arch.

B. OCCLUSAL SURFACE – the "chewing" surfaces of the posterior teeth, both the premolars and the molars. (Note: anterior teeth have "incisal edges": these are not classified as surfaces.) The occlusal surface is *not* an axial surface.





C. PROXIMAL SURFACES

Proximal surfaces are the tooth surfaces that are adjacent to each other in the same arch. Mesial and distal surfaces of adjacent teeth are proximal surfaces. The points on the proximal surfaces that actually touch each other are the **contact points** or **contact areas.**

Interproximal space – the space between the proximal surfaces of adjacent teeth is called the interproximal space. Due to the contour of the tooth, the proximal surfaces are *not* in total contact, but only at the contact point.

D. THE NUMBER OF SURFACES

The **anterior teeth** have *four* surfaces (all axial).

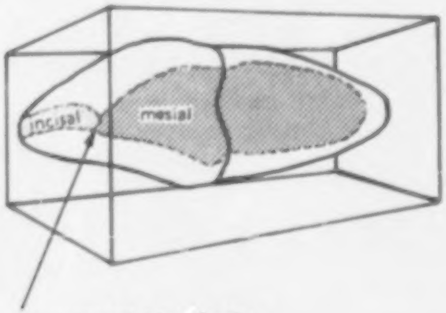
The **posterior teeth** have *five* surfaces.

V. Angles of the Teeth

An angle is the junction of two or more surfaces of a tooth.

A. LINE ANGLE

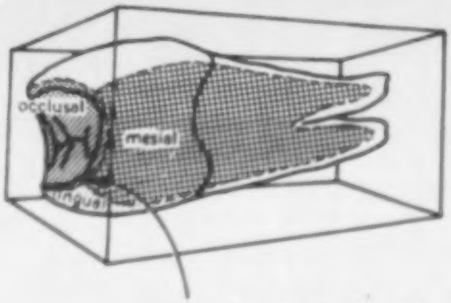
– – is that angle formed by the junction of *two* surfaces of a tooth crown along an imaginary line. Its name is derived by combining the names of two surfaces.



Mesioincisal Line Angle

B. POINT ANGLE

– – is that angle formed by the junction of *three* surfaces at one point. Point angles are named by combining the names of the three surfaces forming them. As an example, the mesiolinguocclusal point angle.



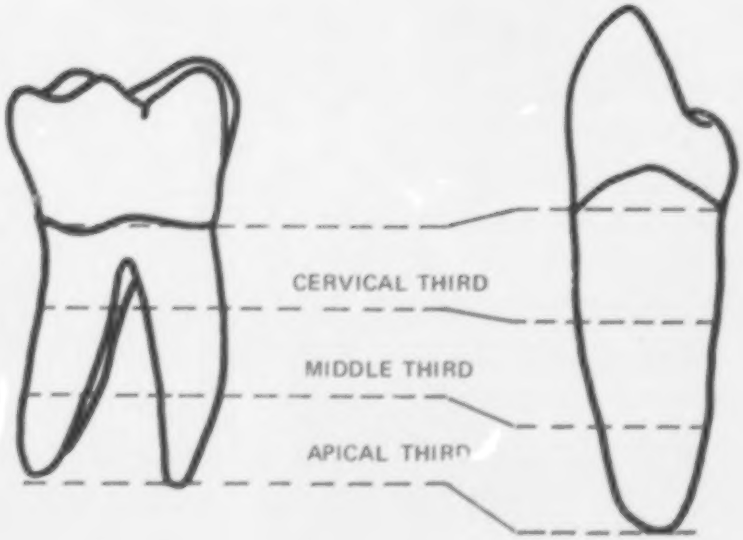
Mesiolinguocclusal Point Angle

VI. Division Into Thirds

For the purposes of description and comparision, each surface of a tooth is divided into thirds. This makes it possible to visualize designated points specifically. These thirds are named in accordance with the areas they approximate.

A. The root of the tooth is divided into thirds *parallel with the occlusal or incisal surface. It is divided into:*

the apical third (after "apex, or pointed end)
the middle third
the cervical third (after "cervix" or neck)

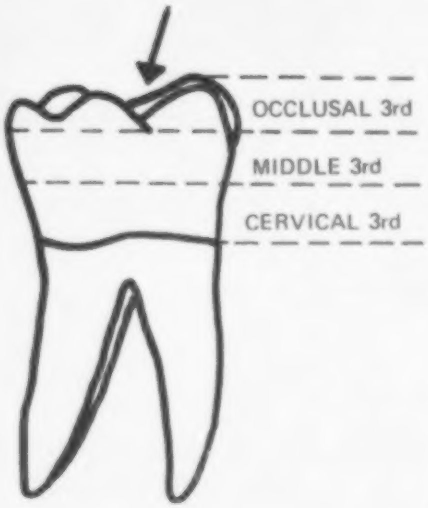


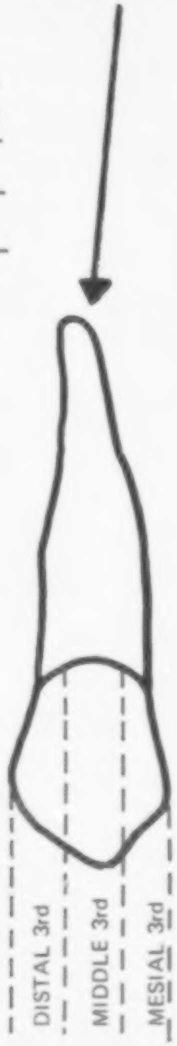
B. The crown of the tooth is divided into thirds in three different directions:

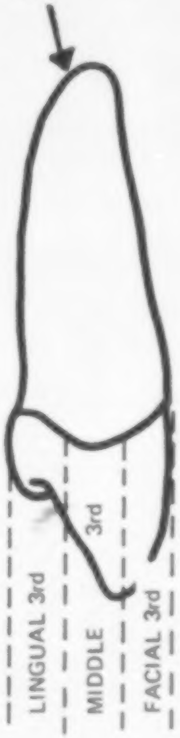
a. parallel to the occlusal or incisal surface
b. longitudinally in the mesial-distal direction
c. longitudinally in a labial-lingual or buccal-lingual direction.

C. Division of the Crown into Thirds

Occlusocervical	**Mesiodistal**	**Faciolingual**
(1) occlusal third	(1) mesial third	(1) facial third
(2) middle third	(2) middle third	(2) middle third
(3) cervical third	(3) distal third	(3) lingual third


OCCLUSAL 3rd
MIDDLE 3rd
CERVICAL 3rd


DISTAL 3rd
MIDDLE 3rd
MESIAL 3rd


LINGUAL 3rd
MIDDLE 3rd
FACIAL 3rd

VII. Anatomic Features

The teeth help to maintain the dental arches by their location, functional form, and by helping to develop and protect the gingival tissues that support them. These anatomic features will be covered next.

A. CONTOURS

The crown of the tooth narrows toward the cervical line. Although the general contour of the different types of teeth may vary, this general principal holds for all four surfaces. The pronounced curvatures found on the labial or buccal and lingual surfaces of the tooth act as a protection to the gingiva from food impaction and trauma during mastication. Without adequate contour, the gingiva may become damaged, and will lack adequate stimulation. The contours of the medial and distal surfaces help to determine normal contact and embrasure form, which tend to be self-cleansing, thus further contributing to the tooth's own self-preservation.

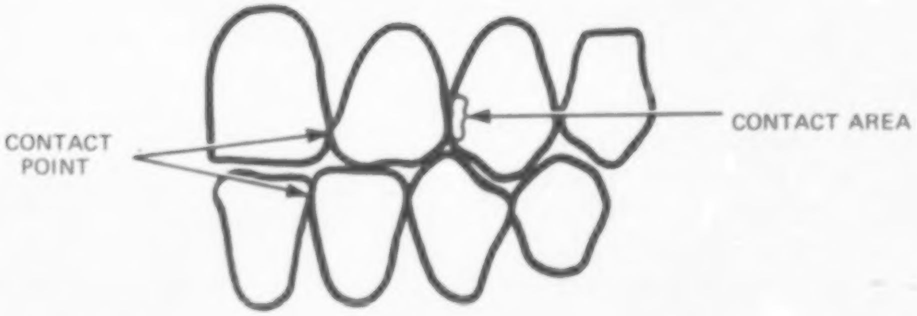
B. CONTACTS

Each tooth crown should be in contact at some point with the adjacent tooth. Proper contact relation between adjacent teeth does three things:

1. It serves to keep food and debris from being trapped between the teeth.
2. It stabilizes the dental arches by anchoring the teeth in each arch in positive contact with each other.
3. It protects the interproximal gingival tissue from trauma during mastication.

Contact area – is that region of the mesial or distal surface of a tooth which touches the adjacent tooth in the same arch.

Contact point – would be the exact spot where the teeth actually touch each other. The terms "contact" or "contact area" are more frequently used than is the term "contact point."

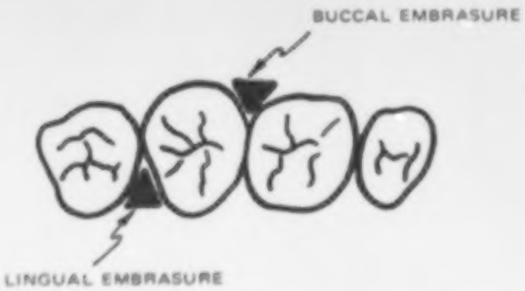


C. EMBRASURE

The **embrasure** is the V-shaped space between the proximal surfaces of two adjoining teeth in contact.

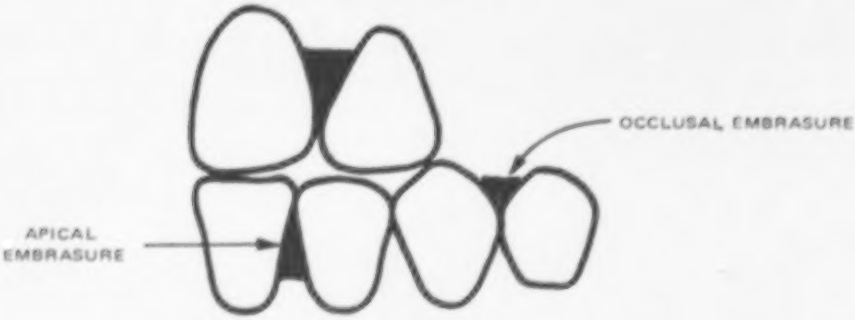
The embrasure may diverge:

1. buccally or labially



OCCLUSAL VIEW

2. lingually
3. occlusally
4. apically – the interdental papilla fills this embrasure.



FACIAL VIEW

The correct anatomic restoration of the proximal surfaces of teeth presents a challenge to the dentist.

D. OCCLUSAL FORM

Occlusion is the relationship of the maxillary and mandibular teeth to each other when the jaws are closed.

Occlusal surfaces are those surfaces that come into occlusion when the jaws are closed.

This term is also used to describe the chewing or grinding surfaces of a tooth. Cutting surfaces are referred to as incisal edges. Therefore, only posterior teeth have occlusal surfaces; anterior teeth have incisal edges.

There are no flat surfaces or planes to be found on normal teeth except those due to wear or accident. Each part of the anatomical design of the tooth has a specific function.

The mandibular teeth are the active (movable) ones. At the time of closure of the jaws, the mandibular posterior teeth operate as cutters and grinders as they contact the immovable maxillary teeth. The cusps of the teeth appear to be arranged with special regard for the stabilization of the mandible, and to permit mandibular movements without cuspal interference.

The perimeter of the maxillary arch is greater than that of the mandibular arch. Therefore the maxillary incisors and cuspids are labial to the lower teeth. The facial cusps of the maxillary teeth extend over the facial surfaces of the mandibular teeth. The lingual cusps of the posterior maxillary teeth occlude in the central fossae of the mandibular teeth.

The posterior teeth are designed for the grinding of the food. Some of the occlusal contacts of the cusps and fossae are arranged to produce a mortar and pestle action for the effective grinding of the food. This arrangement also serves to confine the shock or force of contact within the root bases of the teeth.

VIII. The Physiology of Occlusion

The concept of occlusion is described in many ways. However, as a simplified introduction to functional occlusion, the definition presented here is that of Dr. Ira Franklin Ross in his book, *Occlusion, A Concept for the Clinician* (The C.V. Mosby Co., St. Louis, 1970.)

"Occlusion is the contact between the maxillary and mandibular teeth in all mandibular positions and movements. It is the result of the neuromuscular control of the components of the masticatory system."

The components of the masticatory system are:

(1) the teeth
(2) the periodontal structures
(3) the maxillae
(4) the mandible
(5) the temporomandibular joints
(6) the associated muscles and ligaments

Physiologic occlusion is an occlusion in which all the components of the masticatory system function without pain and remain in a stable, healthy condition.

Specifically, in physiologic occlusion the following conditions exist:

1. The teeth remain firm.
2. The teeth do not migrate.
3. The teeth do not cause pain during or after contact.
4. The temporomandibular joints and associated structures function freely and without pain.
5. There is no food impaction.

IX. General Characteristics Common to All Teeth

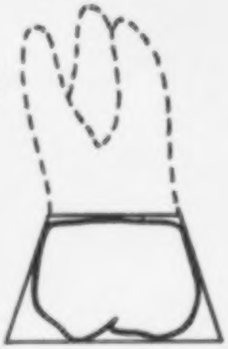
1. Teeth develop from lobes: four lobes per tooth, except the maxillary and mandibular first molar, which has five lobes.

   As biscuits rise in a pan, some fuse to form a continuous outline, with only a hint of separation (the central incisors). Other biscuits divide into two or more distinct parts, round in shape, with a valley or groove between.

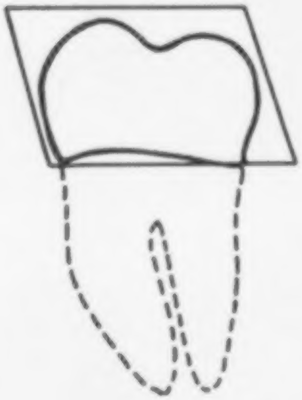
2. The labial/buccal and lingual aspects of all teeth are generally trapezoidal in shape.

3. All teeth are found to oppose two others in an *antagonistic* position except the mandibular central incisor and the maxillary 3rd molar. (These are the first and last teeth in opposing quadrants).

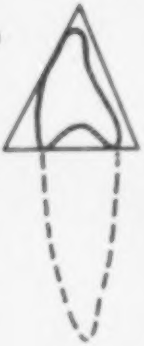
4. All maxillary posterior teeth are generally trapezoidal in shape as viewed from the mesial/distal aspect, with the longest side at the cervical line.



5. All mandibular posterior teeth are generally rhomboidal in shape as viewed from the mesial/distal aspect.



6. All anterior maxillary and mandibular teeth are generally triangular in shape as seen from the mesial/distal aspect.

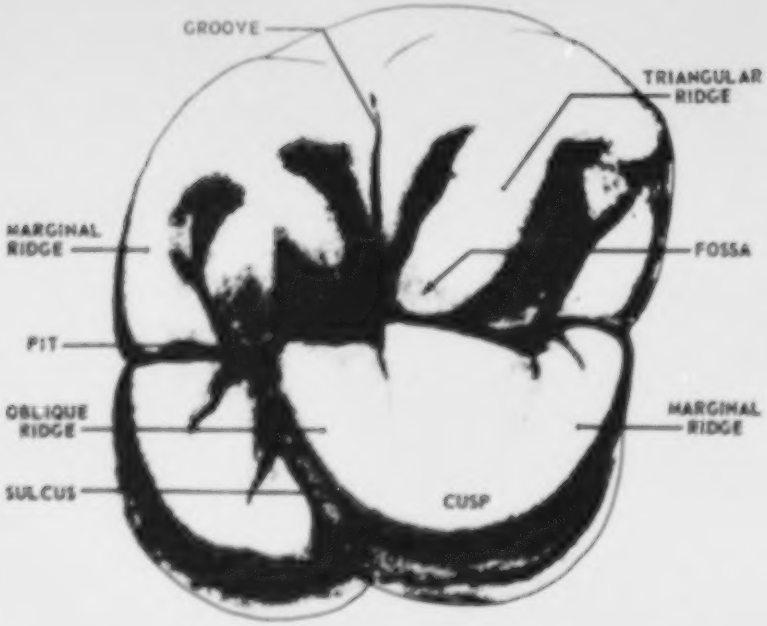


7. All teeth have a more nearly oval curve on the distal surface, with the contact area at or near the middle third of the crown. The mesial surface is straighter, with a sharp curve and contact area at the occlusal third of the crown– see illustration of antagonists, page 151.

8. The curve of the cervical line is always deeper (extending further in the occlusal direction) on the mesial surface than on the distal surface.

9. The height of the crown as seen distally is less generally than from the mesial aspect. Often you can see part of the occlusal surface from this view.

X. Definitions of Occlusal Features.



1. A LOBE is a primary division of the crown of a tooth. Each lobe was a center of calcification in the developing tooth. Cusps and cingula represent developmental lobes.

2. A RIDGE is a long narrow elevation on the surface of a tooth.

3. A TRIANGULAR RIDGE is an elevation that extends from the cusp to a central point on the occlusal surface of a tooth.

4. A MARGINAL RIDGE is an elevation that extends along the mesial or distal margin of the occlusal surface of a biscuspid or molar and the lingual surface of an incisor or cuspid.

5. An OBLIQUE RIDGE is an elevation that runs obliquely across the occlusal surface of a maxillary molar.

6. A PIT is a small, pointed depression in the enamel of a tooth.

7. A FOSSA is a rounded or wedge-shaped depression on the surface of a tooth.

8. A SULCUS is an elongated fossa.

9. A GROOVE is a sharp linear depression in the enamel of a tooth.

10. A DEVELOPMENTAL GROOVE is a depression in the crown of a tooth that marks the boundary between separate lobes.

11. A FISSURE is a linear defect or crack in the enamel.

The Deciduous Teeth As Compared to the Permanent Teeth

1. In the permanent tooth, the crown width mesiodistally is wider than the crown height; in the deciduous tooth the dimensions are more nearly equal.

2. The deciduous roots are more narrow and long in relationship to crown height and width than found on permanent teeth.

3. The deciduous molar roots curve more than the permanent-molar roots mesiodistally to allow room for the permanent tooth bud to develop.

4. Crown and root are more slender mesiodistally at the cervical third.

5. The buccal and lingual surfaces are flatter above the cervical third, tapering to a smaller occlusal surface.

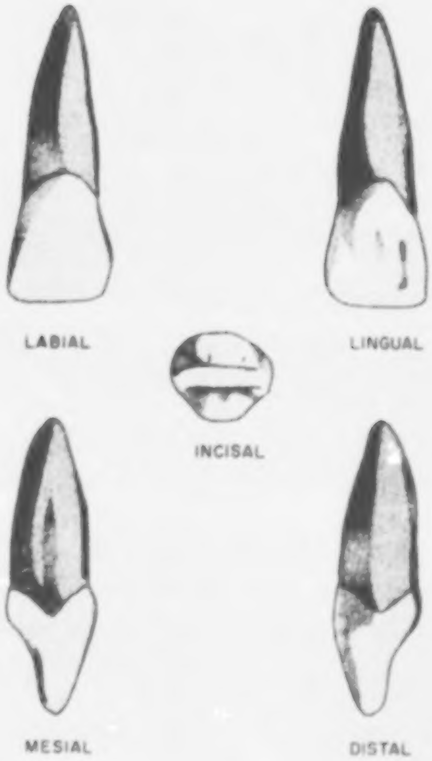
6. The color of the crown is lighter here.

THE PERMANENT TEETH

INCISORS

I. – Maxillary Central Incisor

A. Labial Aspect
  1. Shape – trapezoidal to incisal ridge
  2. Size – large
  3. Mesial profile – straight
  4. Distal profile – convex
  5. Incisal profile – slightly convex
  6. C.E.J. profile – convex semicircle (as viewed from incisal edge)
  7. Mesial contact – incisal third
  8. Distal contact – incisal/middle third
  9. Mesiodistal width – widest of all incisors
  10. Cervical – incisal height – highest of incisors
  11. Lobes – visible



Maxillary left central incisor

B. Lingual aspect
  1. Shape – trapezoidal, smaller than labial
  2. Marginal ridges and cingulum – moderate in outline
  3. Lingual fossa – moderately concave

C. Mesial aspect
  1. Shape – triangular, base at cervix
  2. Cingulum – moderately convex
  3. C.E.J. – concave, deepest of any tooth

D. Distal aspect
  1. Shape – triangular, smaller than mesial
  2. C.E.J. – less concave than mesial

E. Incisal aspect
  1. Labial surface – slightly convex
  2. Lobes – visible
  3. Mesio- and disto-labial line angles – sharp angles
  4. Mesial-distal surface – mesial marginal ridge longer than distal

II. – Maxillary Lateral Incisor

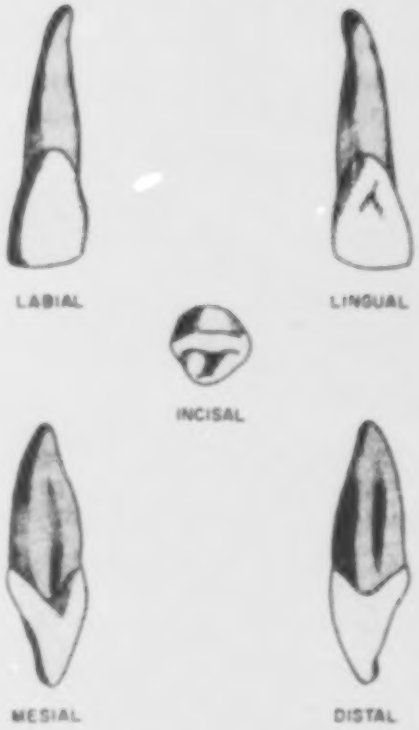
A. Labial aspect
   1. Shape – trapezoidal to incisal ridge
   2. Size – medium
   3. Mesial profile – slightly convex
   4. Distal profile – highly convex
   5. Incisal profile – slightly convex
   6. C.E.J. – convex semicircle
   7. Mesial contact – incisal/middle third
   8. Distal contact – middle third
   9. Mesiodistal width – medium
   10. Cervical – incisal height – smaller than central incisor
   11. Lobes – barely visible

B. Lingual aspect
   1. Shape – trapezoidal, smaller than labial
   2. Marginal ridges and cingulum – prominent
   3. Lingual fossa – concave

C. Mesial aspect
   1. Shape – triangular, base at cervix
   2. Cingulum – convex
   3. C.E.J. – deeply concave

D. Distal aspect
   1. Shape – triangular, smaller than mesial
   2. C.E.J. – less concave than mesial

E. Incisal aspect
   1. Labial surface – convex
   2. Lobes – slightly visible
   3. Mesio- and disto-labial line angles – rounded
   4. Mesial-distal surface – mesial marginal ridge longer than distal



Maxillary left lateral incisor

III. – Mandibular Central Incisor

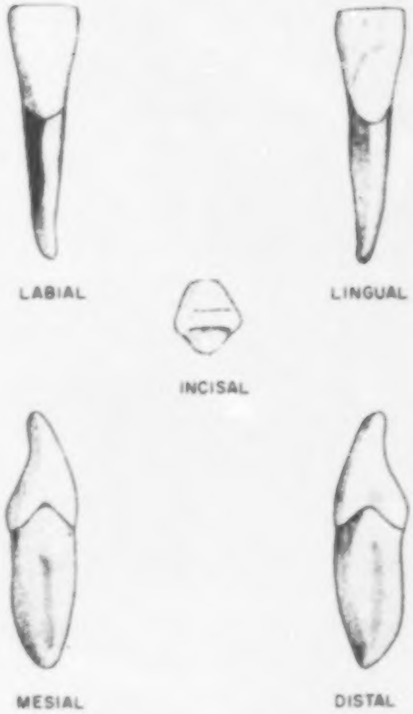
A. Labial aspect
1. Shape – trapezoidal to incisal ridge
2. Size – smallest incisor
3. Mesial profile – straight
4. Distal profile – straight (only such tooth)
5. Incisal profile – straight
6. C.E.J. profile – shallow convex
7. Mesial contact – incisal third
8. Distal contact – incisal third
9. Mesiodistal width – narrow
10. Cervical-incisal height – medium
11. Lobes – not visible

B. Lingual aspect
1. Shape – trapezoidal to the incisal ridge
2. Marginal ridges and cingulum – just visible
3. Lingual fossa – shallow concave

C. Mesial aspect
1. Shape – triangular, base at cervix
2. Cingulum – slightly convex
3. C.E.J. profile – highly concave

D. Distal aspect
1. Shape – triangular, same as mesial
2. C.E.J. profile – less concave than mesial

E. Incisal aspect
1. Labial surface – convex
2. Lobes – not visible
3. Mesio- and disto-labial line angles – sharp angles
4. Mesial and distal surfaces – equal

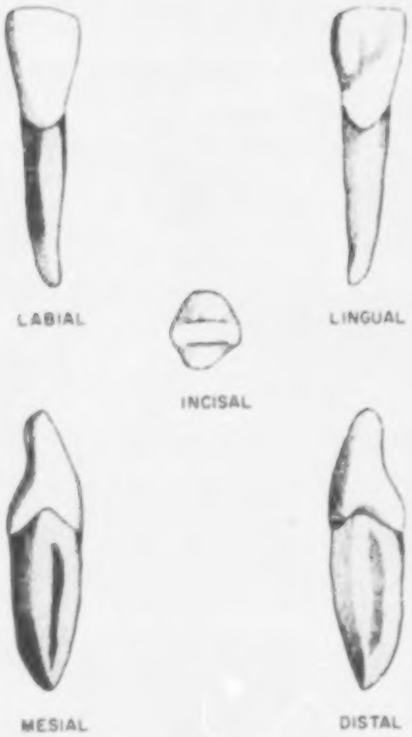


Mandibular left central incisor

IV. – Mandibular Lateral Incisor

A. Labial aspect
  1. Shape – trapezoidal to incisal ridge
  2. Size – larger than central
  3. Mesial profile – straight
  4. Distal profile – slightly convex
  5. Incisal profile – straight
  6. C.E. J. profile – convex semicircle
  7. Mesial contact – incisal third
  8. Distal contact – incisal third
  9. Mesiodistal width – narrow
  10. Cervical-incisal height – medium
  11. Lobes – not visible

B. Lingual aspect
  1. Shape – trapezoidal to incisal ridge
  2. Marginal ridges and cingulum – just visible
  3. Lingual fossa – shallow concave



Mandibular left lateral incisor

C. Mesial aspect
  1. Shape – triangular, base at cervix
  2. Cingulum – slightly convex
  3. C.E.J. profile – highly concave, but less than central

D. Distal aspect
  1. Shape – triangular, same as mesial
  2. C.E.J. profile – less concave than mesial

E. Incisal aspect
  1. Labial surface – convex
  2. Lobes – not visible
  3. Mesio- and disto-labial line angles – sharp angles
  4. Mesial and distal surfaces – twisted on base, distal shorter

The CANINES – General Information

1. The canine is located distal to the lateral incisor and mesial to the first premolar. The maxillary canine occludes with the mandibular canine (distal side) and the mandibular first premolar (mesial side)

2. The only single cuspids in the arch, the canine is the last of the anterior teeth and forms the corners of the visible mouth area.

3. The canine is used for seizing, cutting, piercing, and tearing food.

4. The canine is the most stable tooth on the mouth. It has the longest root and the thickest labiolingual width.

5. Its height and width almost equal the maxillary central incisor.

6. Its position and the shape of its surface act as efficient self-cleansing aids.

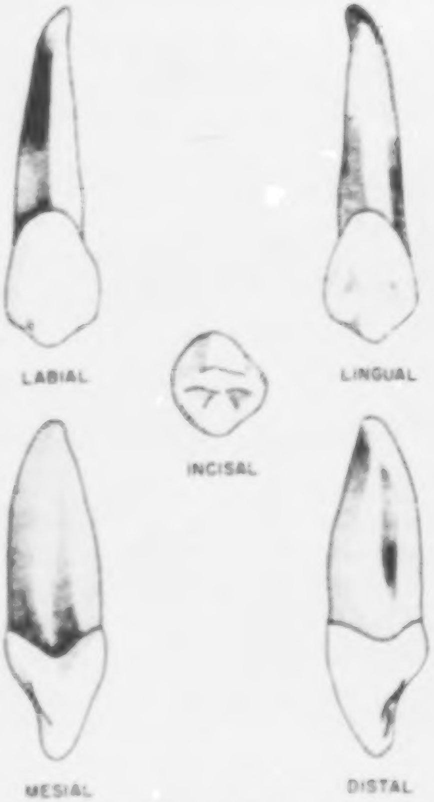
7. Its size generally makes it the last tooth to be lost in either arch.

8. The canine is the only cuspid tooth with a functional lingual rather than occlusal surface.

9. The canine physically resembles the shape of the incisor mesially and the premolar distally, while its well-developed middle lobe ends in a well-formed cusp.

V. – The Maxillary Canine

A. Labial aspect
  1. Shape – trapezoidal to contact areas, then triangular to cusp tip.
  2. Size –
    a. incisal-cervical height – greater than maxillary central
    b. mesial-distal width – wide
  3. Mesial profile – slightly convex to contact area, then straight to cusp tip
  4. Distal profile – concave to middle third; convex to cusp tip
  5. Incisal profile –
    triangular, distal side longer
    cusp tip in line with apex of root
    cusp width equal to one-third to one-half crown height
  6. C.E.J. profile – convex
  7. Mesial contact – incisal third
  8. Distal contact – incisal third
  9. Surface contour – cusp ridge pronounced, shallow depressions on either side
  10. Root – conical, longest of any tooth
    – tapers evenly to a point



Maxillary left canine

B. Lingual aspect
  1. Shape – reverse of labial aspect
  2. Surface contour –
    a. Mesial/distal marginal ridges and cingulum – prominent
    b. Lingual ridge – runs from cusp tip to cingulum
    c. Lingual fossa – concave, deep
    d. Lingual pit and grooves – common

  3. Root – narrow, mesial and distal labial outlines visible

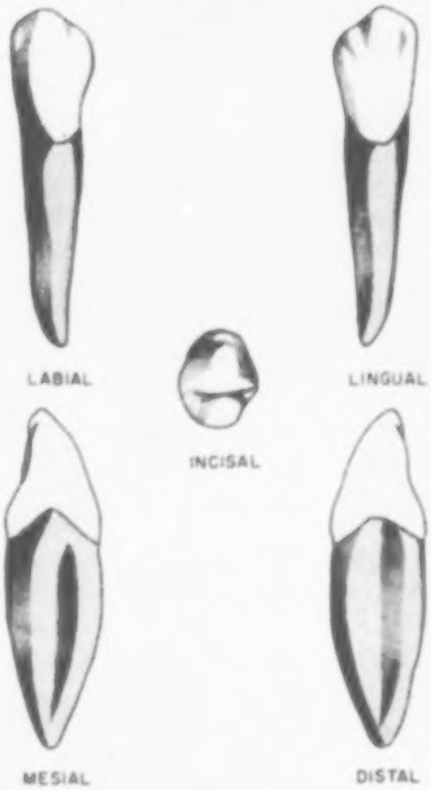
C. Mesial aspect
  1. Shape – triangular – shows relation to incisor group
  2. Size – Labial-lingually, widest of all anterior teeth
  3. Labial profile – slightly convex
  4. Lingual profile – convex from cervical line to middle third (outline of large cingulum)
     – concave (fossa) to rounded tip
  5. C.E.J. – deeply concave
  6. Surface contour – smoothly convex to contact area
     – shallow depression from contact area to middle third of root
  7. Root – conical, wide cervical third, tapering to point

D. Distal aspect
  1. Shape – reverse of medial
  2. Surface contour – depression deeper
  3. C.E.J. – less concave

E. Incisal aspect
  1. Labial surface – oval, flattens toward distal side
  2. Lingual surface – "u" shape, large cingulum, all ridges prominent
  3. Lobes – visible
  4. Mesio-labial line angle – sharp angle
  5. Disto-labial line angle – rounded
  6. Mesial and distal surfaces – equal

VI. – The Mandibular Canine

A. Labial aspect
   1. Shape – trapezoidal to contact area, then triangular to cusp tip
   2. Size –
      a. Incisal-cervical height – narrow compared to maxillary canine
      b. Mesial-distal width – medium
   3. Mesial profile – straight to contact area, rounded angle, then straight to cusp tip
   4. Distal profile – straight to contact area, convex to cusp tip
   5. Incisal profile –
      - triangular, distal side longer
      - cusp tip mesial to apex of root
      - cusp width equal to one-fourth to one-third crown height
   6. C.E.J. profile – convex
   7. Mesial contact – incisal third
   8. Distal contact – incisal/middle third
   9. Surface contour – cusp ridge less pronounced than maxillary canine
   10. Root – conical, tapering evenly to point – crown looks tilted distally on root.



Mandibular left canine

B. Lingual aspect
   1. Shape – reverse of labial aspect
   2. Surface contour
      a. Mesial/distal marginal ridges and cingulum – faint
      b. Lingual ridge – faint
      c. Lingual fossa – shallow, concave
      d. Lingual pit and grooves – rare
   3. Root – narrow, depressions visible

C. Mesial aspect
1. Shape – triangular
2. Size – labial-lingually – medium
3. Labial profile – slightly convex
4. Lingual profile – convex from cervical line to middle third (outline of small cingulum)
   – concave (shallow fossa) to rounded tip
5. C.E.J. – concave
6. Surface contour – smoothly convex to contact area; deep depression to middle third of root
7. Root – conical, wide cervical third, tapering to point; developmental depression noticeable.

D. Distal aspect
1. Shape – reverse of mesial
2. Surface contour – depression deeper
3. C.E.J. – less concave

E. Incisal aspect
1. Labial surface – oval, flatter approaching distal side
2. Lingual surface – "V" shape, small cingulum ridges not prominent
3. Lobes – not visible
4. Mesio-labial line angle – sharp angle
5. Disto-labial line angle – rounded, less sharp than maxillary canine
6. Mesial and distal surfaces – equal

The PREMOLARS – General Information

1. The premolars are located distal to the canine, and they aline as follows:

   Mesial surface of first premolar with distal surface of canine
   Mesial surface of second premolar with distal surface of first premolar
   Distal surface of second premolar with mesial surface of first molar

2. The maxillary premolars occlude as follows:

   First premolar – mesial surface to distal surface of mandibular first premolar
   distal surface to mesial surface of mandibular second premolar

   Second premolar – mesial surface to distal surface of mandibular second premolar
   distal surface to mesial surface of mandibular first molar

3. Premolars are the intermediate teeth in the arch. They have a major (buccal) and minor (lingual) cusp for tearing, and a medium-size surface for grinding and chewing.

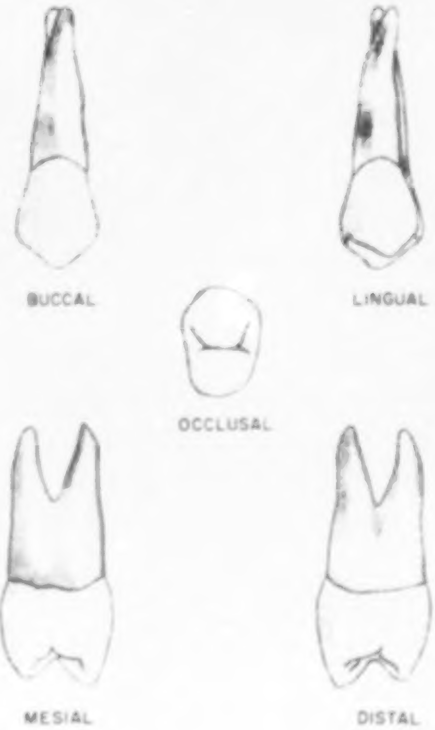
4. The four maxillary premolars are similar in size, shape, and contour.

5. The buccal cusps of both maxillary and mandibular premolars are a little longer than the lingual cusps.

VII. – Maxillary first premolar

A. Buccal aspect

1. Shape – trapezoidal to contact areas, triangular to cusp tip
2. Size – smaller than canine.
    a. occlusal-cervical height – medium
    b. mesial-distal width – medium
3. Mesial profile – concave from cervix to a broad convex contact area, then straight to the cusp tip
4. Distal profile – straight from cervix to a broad convex contact area, then convex to cusp tip
5. Occlusal profile – triangular from contact areas; mesial slope straighter, longer than distal
6. C.E.J. profile – slightly convex
7. Mesial contact – middle third
8. Distal contact – middle third
9. Surface contour – convex; middle lobe pronounced, resulting in a buccal ridge from cervix to cusp tip, with a shallow depression on either side.
10. Root – bifurcated, conical, tapering evenly to blunted apexes
    – smaller than canine
    – outline of second apex sometimes visible



Maxillary left first premolar

B. Lingual aspect

1. Shape – reverse of buccal
2. Size – smaller than buccal
3. Mesial and distal profiles – symmetrical
4. Occlusal profile – lingual cusp slopes steeper, of equal length
    – buccal cusp outline in plain view
5. C.E.J. profile – slightly convex
6. Surface contour – smooth, convex
7. Root – conical, apex more blunt than buccal
    – buccal root often visible, along with mesial depression

C. Mesial aspect
  1. Shape – trapezoidal with cusp tips triangular
  2. Buccal profile – convex
     – height of curve at cervical third
  3. Lingual profile – uniformly convex
     – height of curve at middle third
  4. Occlusal profile – buccal cusp longer
     – triangular ridges slope about 45°
     – mesial marginal ridge from cusp to cusp, interrupted by mesial marginal developmental groove lingual to lingual cusp ridge
     – cusp tips within total width of root (a feature of all maxillary posterior teeth)
  5. C.E.J. profile – irregular
  6. Surface contour – smoothly convex
     – concave developmental depression at cervical third of root extending full length of root trunk
  7. Roots – two roots, divided at middle to apical third.
     – developmental depression to cervical line
     – buccal root longer

D. Distal aspect
  1. Shape – reverse of mesial aspect
  2. Occlusal profile – more surface visible, no marginal groove
  3. Surface contour – smooth and convex, no developmental depression
  4. C.E.J. profile – less pronounced than on mesial aspect

E. Occlusal aspect
  1. Shape – hexagonal (six-sided)
  2. Buccal surface – triangular, base through cusp ridge
  3. Mesial and distal surfaces – straight, converging to small lingual surface
     – distal surface longer
  4. Lingual surface – rounded triangle, base through lingual cusp ridge
  5. Occlusal surface
     a. Ridges
        mesiobuccal cusp ridge
        distobuccal cusp ridge
        mesiolingual cusp ridge
        distolingual cusp ridge
        mesial marginal ridge
        distal marginal ridge
        → form trapezoids based on central groove

a. Ridges (continued)
  - buccal triangular – cusp to central groove
  - lingual triangular – cusp to central groove
  - transverse ridge – includes both triangular ridges

b. Developmental grooves
  1. central – runs mesiodistally, divides cusps
  2. mesiobuccal – from central towards mesiobuccal line angle
  3. distobuccal – from central toward distobuccal line angle – Three grooves together form a large "U" around the buccal cusp.
  4. distolingual – short, from central toward distal marginal ridge (counterpart of mesial marginal), but *does not touch* ridge
  5. mesial marginal – from junction of central and mesiobuccal grooves, mesially across the mesial marginal ridge, down the mesial surface

c. Triangular fossae
  1. mesial – from mesiobuccal cusp ridge near mesial marginal ridge, beyond junction of central, mesiobuccal, and mesial marginal grooves, to mesiolingual cusp ridge near mesial marginal ridge.
  2. distal – from distobuccal cusp ridge near distal marginal ridge, beyond junction of central and distobuccal grooves to distolingual cusp ridge, near distal marginal ridge.

d. Developmental pits
  1. mesial – in mesial fossa, at the junction of central, mesiobuccal, and mesial marginal grooves
  2. distal – in distal fossa, at the junction of central and distobuccal grooves

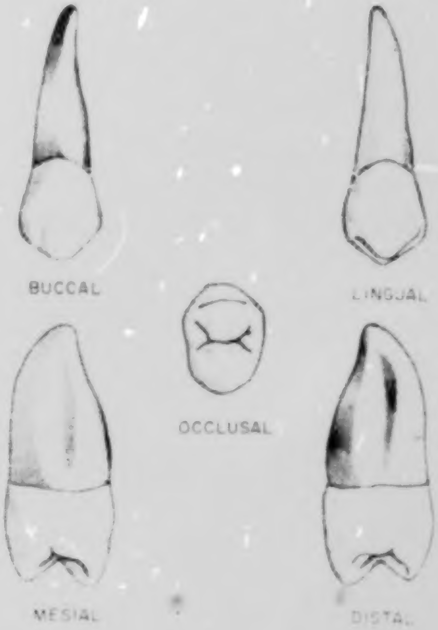
e. Supplemental grooves – none

f. Developmental depressions – common from central groove bucally

VIII. – Maxillary Second Premolar

(This tooth is so similar to the maxillary first premolar that a study of the differences is the most useful way of learning about it.)

A. Buccal aspect
   1. Shape – less angular, more oblong
   2. Size – slightly smaller
   3. Mesial profile – similar
   4. Distal profile – similar
   5. Occlusal profile – mesial slope shorter than distal; cusp is shorter and less pointed than on first premolar
   6. C.E.J. profile – wider mesiodistally
   7. Mesial contact – similar
   8. Distal contact – similar
   9. Surface contour – similar
   10. Root – single – conical, tapers evenly



Maxillary left second premolar

B. Lingual aspect
   1. Shape – similar
   2. Size – similar
   3. Mesial and distal profile – similar
   4. Occlusal profile – little or no buccal outline seen
   5. C.E.J. profile – wider mesiodistally
   6. Surface contour – similar
   7. Root – tapers evenly

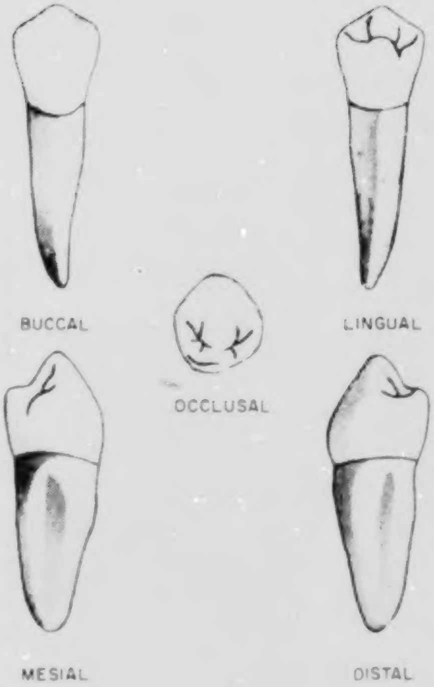
C. Mesial aspect
   1. Shape – similar
   2. Buccal profile – similar
   3. Lingual profile – similar
   4. Occlusal profile – buccal cusp shorter, lingual longer (*appear* same size as first premolar)
      – cusp tips wider apart.
   5. C.E.J. profile – similar
   6. Surface contour – no depression on crown
   7. Root – conical, shallow depression

D. Distal aspect
  1. Shape – similar
  2. Occlusal profile – similar
  3. Surface contour – similar
  4. C.E.J. profile – similar

E. Occlusal aspect
  1. Shape – oval
  2. Buccal surface – convex
  3. Mesial and distal surfaces – straight, less convergence
  4. Lingual surface – convex, cusp larger
  5. Occlusal surface
    a. Ridges
      mesiobuccal cusp ridge
      distobuccal cusp ridge
      mesiolingual cusp ridge
      distolingual cusp ridge
      → form rectangles
      buccal triangular ridge – similar
      lingual triangular ridge – similar
      transverse ridge – similar
    b. Developmental grooves
      1. central – similar
      2. lingual grooves – one or both pronounced
      3. supplemental grooves – from central groove toward buccal and/or lingual
         – replaces definite mesiobuccal and distobuccal grooves
    c. Triangular fossa – none
    d. Pits
      1. mesial – junction of short central with lingual and/or supplemental grooves
      2. distal – junction of short central with lingual and/or supplemental grooves

IX. – Mandibular First Premolar

A. Buccal aspect
  1. Shape – trapezoidal to contact areas, triangular to cusp tip
  2. Size – equal to maxillary premolars in height and width
  3. Mesial profile – straight to contact area, large curve, straight to cusp tip
  4. Distal profile – concave to contact area, large curve, slightly concave to cusp tip
  5. Occlusal profile – triangular from contact areas; large, pointed cusp tip; mesial slope shorter than distal slope
  6. C.E.J. profile – shallow convex
  7. Mesial contact – occlusal to middle third
  8. Distal contact – occlusal to middle third
  9. Surface contour – convex, cusp lobe highly developed, depressions either side of buccal ridge
  10. Root – single, conical tapers evenly



Mandibular left first premolar

B. Lingual aspect
  1. Shape – reverse of buccal aspect
  2. Size – smaller than buccal
  3. Mesial/distal profiles – reverse of buccal
  4. Occlusal profile – small, pointed lingual cusp, large buccal cusp, occlusal surface in plain view
     – mesiolingual developmental groove extends to middle third
  5. C.E.J. profile – slightly convex
  6. Surface contour – narrow, convex, concave depressions on either side of lingual cusp in cervical and middle thirds
  7. Root – conical, narrow concave depressions continuing from crown to apex

C. Mesial aspect

1. Shape – rhomboidal with triangular cusps
2. Buccal profile – uniformly convex to cusp tip
3. Lingual profile – slightly convex lingual cusp ends at middle third
4. Occlusal profile – buccal cusp dominates, surface inclined 45° lingually
   – buccal triangular ridge and mesial marginal ridge visible
   – mesiolingual developmental groove visible
5. C.E.J. profile – slightly concave
6. Surface contour – convex in contact areas, concave below
   – broken by mesiolingual groove
7. Root – conical, tapers slowly to center, abruptly to apex
   – depression from apex to cervical third, often with developmental groove in center.

D. Distal aspect

1. Shape – reverse of mesial
2. Occlusal profile – buccal triangular ridge visible
   – lingual marginal ridge higher on occlusal surface
   – sometimes a mesial and/or distal groove
3. Surface contour – smooth, more convex
   – concave area above cervix flatter
4. C.E.J. profile – less concave
5. Root – reverse of mesial, shallow depression, no groove

E. Occlusal aspect

1. Shape – rounded diamond
2. Buccal surface – two-thirds visible – large triangle
3. Mesial and distal surfaces – converge lingually, rounded, equal
4. Lingual profile – one-third visible – small triangle
5. Occlusal surface
   a. Ridges
      mesiobuccal cusp ridge
      distobuccal cusp ridge
      mesial marginal ridge – short
      distal marginal ridge – longer
      buccal triangular ridge – cusp to central groove
      lingual triangular ridge – cusp to central groove
      transverse ridge – includes both triangular ridges
   b. Developmental grooves
      central – divides cusps
      mesiolingual – central lingually across mesial marginal ridge
      mesial – from junction of central and mesiolingual, runs buccally
      distal – from central, runs buccally

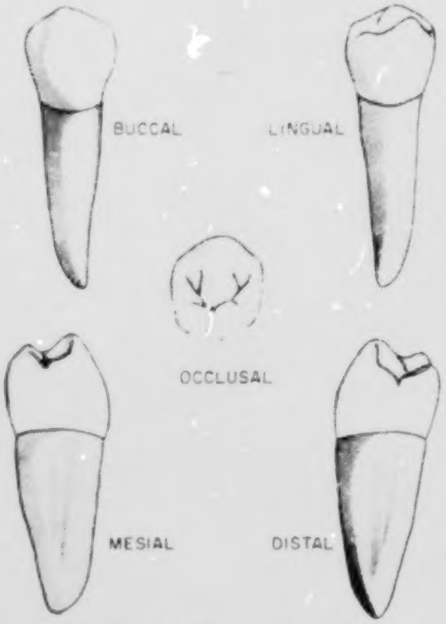
c. Fossae

mesial – from mesial margin, surrounds mesial pit, junction central groove and mesiolingual groove

distal – from distal margin, surrounds distal pit and groove

X. – Mandibular Second Premolar

(The following outline points out only the differences between this tooth and the first mandibular premolar.)



Mandibular left second premolar

A. Buccal aspect
   1. Shape – similar
   2. Size – similar
   3. Mesial/distal profiles – similar
   4. Occlusal profile – cusp shorter, slopes less steep
   5. C.E.J. profile – similar
   6. Mesial and distal contact – similar
   7. Surface contour – similar
   8. Root – broader mesiodistally, apex more pointed

B. Lingual aspect
   1. Shape – similar
   2. Size – similar
   3. Mesial/distal profiles – spherical
   4. Occlusal profile – buccal cusp less pointed
      – lingual side has two cusps each longer than on first premolar
      – less occlusal surface seen
   5. C.E.J. profile – straight
   6. Surface contour – bulbous at contact level, slightly concave below
   7. Root – wider than first premolar and longer

C. Mesial aspect
   1. Shape – similar
   2. Buccal profile – cusp tip more buccal
   3. Lingual profile – more convex, longer, some overhang
   4. Occlusal profile – buccal cusp shorter, lingual cusps longer
      – less surface visible; marginal ridge less steep
      – whole surface less lingually inclined
   5. C.E.J. profile – similar
   6. Surface contour – similar
   7. Root – flatter, longer

D. Distal aspect
   1. Shape – similar
   2. Occlusal profile – lingually, lingual marginal ridge less steep
      – more surface visible than on mesial aspect

E. Occlusal aspect – 3 different patterns. The Y-form is described here.
   1. Shape – rounded square
   2. Buccal profile – convex surface with slight depression either side of buccal ridge
   3. Mesial and distal profiles – mesial flat to concave, distal flat to convex
   4. Lingual profile – rounded, with two cusps
   5. Occlusal surface
      a. Ridges
         mesiobuccal cusp ridge
         distobuccal cusp ridge
         lingual cusp ridge
         mesial marginal ridge
         distal marginal ridge
         buccal triangular ridge – largest
         mesiolingual triangular – medium
         distolingual triangular – small
         transverse – includes buccal triangular and mesiolingual triangular

      b. Developmental grooves
         mesiobuccal – divides buccal from mesiolingual, from central pit to mesial-fossa
         distobuccal – divides buccal from distolingual, from central pit to distal fossa
         lingual – divides lingual cusps, from central pit
         These grooves form a rounded "Y"
      c. Triangular fossae
         1. mesial – inside mesial margin, contains mesial pit and mesiobuccal groove
         2. distal – inside distal margin, contains distal pit and distobuccal groove
      d. Developmental pits
         1. mesial – mesial fossa
         2. distal – distal fossa
         3. central – a "Y" where three grooves meet
      e. Supplemental grooves – usually one from each of the mesial and distal pits

The MAXILLARY MOLARS – General Information

1. There are three molars in each arch. They are located distal to the second premolar.

2. The maxillary molars have broad crowns with large occlusal surfaces and 4 to 5 cusps, featuring 2 buccal cusps.

3. The maxillary molars generally have 3 roots – 2 small buccal roots and one large lingual root – but the number of roots can go to six or possibly even more.

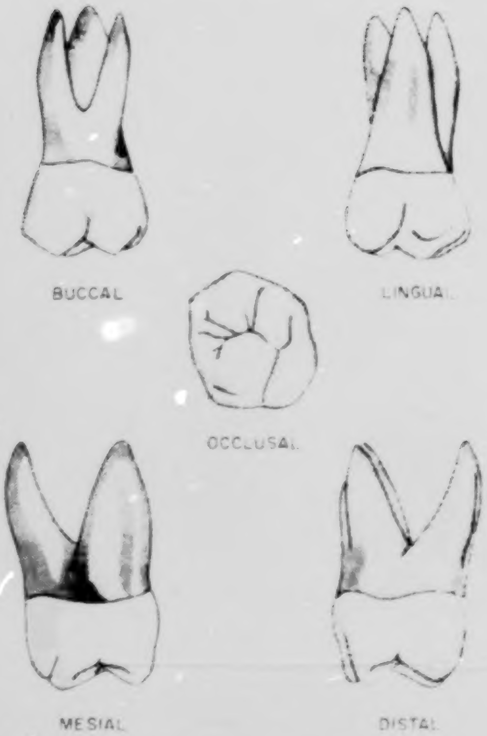
4. The crowns are always broader buccolingually than mesiodistally.

5. The distobuccal and mesiolingual cusps are connected by an oblique ridge.

6. There is a basic triangular pattern that exists between the two buccal cusps and the mesiolingual cusp.

7. The shape of the molar will change from rhomboidal (first molar) to heart-shaped (third molar), depending on the size of the distolingual cusp.

XI. The Maxillary First Molar



Maxillary left first molar

- A. Buccal aspect
  - 1. Shape – trapezoidal to contact areas; cusps are triangular
  - 2. Size – largest maxillary molar
    - a. occlusal-cervical height – largest molar in arch
    - b. mesial-distal width – largest molar in arch
  - 3. Mesial profile – straight to contact area; sharp curve; straight to cusp tip
  - 4. Distal profile – uniformly convex to cusp tip
  - 5. Occlusal profile – 2 buccal cusps
    - mesiobuccal – broader, flatter slopes
    - distobuccal – higher, steeper slopes, cusp sharper
      - –Developmental groove in center of middle third divides cusps and extends toward cervical third.
      - –Often one or both of the lingual cusps are in view.
  - 6. C.E.J. profile – slightly convex but irregular
  - 7. Mesial contact – occlusal third
  - 8. Distal contact – middle third
  - 9. Surface contour – smooth and convex at cervical line
    – flattens in the middle and occlusal thirds
  - 10. Roots – 3 roots visible, forming a close outline
    - a. mesiobuccal root – short, concave for cervical third, convex to apex
    - b. distobuccal root – shortest; concave for cervical third, convex to apex
    - c. lingual root – longest, generally visible between the buccal roots, (middle to apical part visible).
      – "V" of bifurcation at middle third, more cervical.
- B. Lingual aspect
  - 1. Shape – reverse of buccal aspect
  - 2. Size – same as buccal
  - 3. Mesial/distal profiles – reverse of buccal

4. Occlusal profile – 3 cusps, all lingual, in plain view
    a. Distolingual cusp is shorter and rounded, continuing the round line of the distal profile beyond the cusp tip, then continuing downward, ending as a developmental lingual groove in the middle third

    b. Mesiolingual cusp is longer, wider, more pointed, with steeper slopes

    c. Cusp of Carabelli (5th cusp) is small and appears on the mesiolingual cusp from the mesiolingual line angle, pointed toward the mesiolingual cusp tip and ending near the middle of the lingual groove
5. C.E.J. profile – irregular, almost straight
6. Surface contour – convex at cervix, flattening at cusps
7. Root – 3 roots visible
    a. lingual root in front, straight to blunt apex developmental groove
    b. mesiobuccal root, concave to middle third, convex to apex
    c. distobuccal root, cervical third not seen; convex to apex

C. Mesial aspect
1. Shape – trapezoidal with cusp tips triangular
2. Buccal profile – convex at cervix, flattens at contact area, convex to tip
3. Lingual profile – evenly convex to 5th cusp (occlusal/middle third), continuing convex to cusp tip
4. Occlusal profile – slopes shallow, tips wide apart, but within root trunk. Little of occlusal surface visible.
5. C.E.J. profile – irregular, concave
6. Surface contour – slightly convex overall, a concave area from middle third to cervical third of root trunk
7. Roots – 2 roots visible
    a. Mesiobuccal root shorter, wider, slightly concave for cervical third, convex to apex. Below bifurcation straight outline from cervical third to apex.
    b. Lingual root longer, thinner, concave from cervical third, convex to apex. Concave from bifurcation to apex; bifurcation at middle third.

D. Distal aspect

1. Shape – reverse of mesial
2. Occlusal profile – reverse of mesial but smaller buccolingually; more occlusal surface visible
3. Surface contour – smooth and convex overall; concave at cervical third and continuing two-thirds the length of the root
4. Roots – all three roots visible
    - a. lingual root – concave for cervical third, convex to apex
    - b. distobuccal root – concave for cervical third, convex to apex; shorter than lingual and mesiobuccal and inside of mesiobuccal outline
    - c. mesiobuccal root – slightly concave for cervical third, convex to apex

E. Occlusal aspect

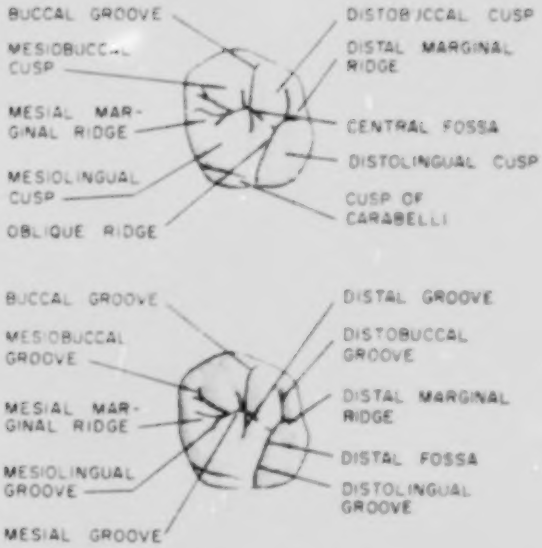
1. Shape – rhomboidal
2. Size – largest maxillary molar
    – wider mesially than distally
    – wider lingually than bucally

    From large to small, the size of cusps is as follows:

    mesiolingual
    mesiobuccal
    distobuccal
    distolingual
    5th cusp

3. Buccal surface – first third visible, convex, tapering distally
4. Lingual surface – half visible, straight, divided by lingual groove
5. Mesial surface – slightly convex, with 5th cusp extending across the mesiolingual line and ending just mesial to the lingual groove
6. Distal surface – convex

7. Occlusal surface


BUCCAL GROOVE
MESIOBUCCAL CUSP
MESIAL MARGINAL RIDGE
MESIOLINGUAL CUSP
OBLIQUE RIDGE
DISTOBUCCAL CUSP
DISTAL MARGINAL RIDGE
CENTRAL FOSSA
DISTOLINGUAL CUSP
CUSP OF CARABELLI
BUCCAL GROOVE
MESIOBUCCAL GROOVE
MESIAL MARGINAL RIDGE
MESIOLINGUAL GROOVE
MESIAL GROOVE
DISTAL GROOVE
DISTOBUCCAL GROOVE
DISTAL MARGINAL RIDGE
DISTAL FOSSA
DISTOLINGUAL GROOVE

Occlusal surface of maxillary left first molar

a. Ridges
   mesiobuccal cusp ridge
   distobuccal cusp ridge
   mesial marginal ridge
   mesiolingual cusp ridge
   oblique (transverse) ridge
   → for triangles excluding distolingual cusp ridge
   distal marginal ridge
   distolingual cusp ridge
   mesiobuccal triangular
   mesiolingual triangular
   distobuccal triangular

b. Developmental grooves
   1. central – divides mesiobuccal from mesiolingual cusps and runs mesially from the central pit to the mesial pit (in mesial triangular fossa).
   2. buccal – divides mesiobuccal from distobuccal cusps and runs buccally from central pit.
   3. lingual – divides mesiolingual from distolingual cusps; becomes oblique groove as it passes between the distolingual cusp ridge and the mesiolingual cusp ridge.

4. oblique groove –
continues the lingual groove and divides the distolingual cusp from the mesiolingual cusp and the distobuccal cusps. It runs diagonally through the transverse groove terminus, then toward the distal marginal ridge and ends at the pit in the distal triangular fossa

5. transverse groove –
divides distobuccal cusp from the mesiolingual cusp and runs from the central pit, junction of the buccal and central grooves, distally to the oblique groove, ending at the distal pit.

6. fifth-cusp groove –
on mesiolingual surface, runs from the mesial surface diagonally toward the distolingual profile and ends near the lingual groove.

c. Supplemental grooves (most commonly found)
   1. from the mesial pit in the mesial triangular fossa in a "Y" pattern toward the mesial marginal ridge
   2. from a pit in the distal triangular fossa in a "Y" toward the distal marginal ridge
   3. random on occlusal surface, often from either side of buccal groove

d. Major fossae
   1. central – bounded by the mesio- and distobuccal cusp ridges, the oblique ridge, the mesiobuccal triangular ridge and the distobuccal triangular ridge.

   2. distal – runs diagonally distal to oblique ridge from distolingual cusp ridge to the distobuccal ridge and contains the distal oblique groove and the distal pit.

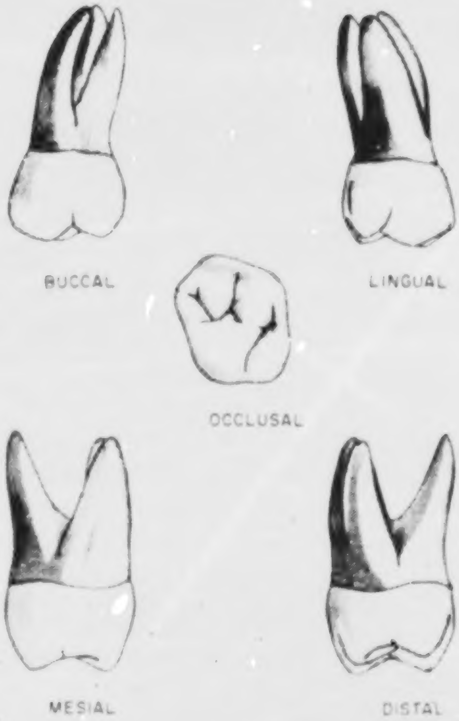
e. Minor fossae
   1. mesial triangular – contains mesial supplemental grooves and mesial pit, and has the mesial marginal ridge as a border.

   2. distal triangular – contains distal supplemental grooves, and a pit and has the distal marginal ridge as a border

XII – The Maxillary Second Molar

A. Buccal aspect

1. Shape – trapezoidal to contact areas: cusps are triangular
2. Size – medium
   - a. occlusal-cervical height – medium
   - b. mesial-distal width – medium
3. Mesial profile – slightly convex to contact area, sharp curve, straight to cusp tip
4. Distal profile – uniformly convex to tip
5. Occlusal profile – 2 buccal cusps, with distobuccal cusp shorter; both cusps pointed, with steep sides
   - part of distal marginal ridge and distolingual cusp visible
   - developmental groove in center of middle third, dividing cusps and extending toward cervical third
6. C.E.J. profile – irregular
7. Mesial contact – occlusal/middle third
8. Distal contact – middle third
9. Surface contour – convex overall, flattening toward cusps
10. Roots – as long as or longer than first molar. Three roots visible
    - mesiobuccal root – short, slightly concave for cervical third, slightly convex to apex.
    - distobuccal root – shortest, relatively straight
    - lingual root – slightly concave from cervical third straight to apex (entire outline visible), distally inclined.



Maxillary left second molar

B. Lingual aspect

1. Shape – reverse of buccal aspect
2. Size – smaller
3. Mesial/distal profiles – reverse of buccal; buccal outline visible
   - Developmental groove divides cusps and extends to middle third.
4. Occlusal profile – distolingual cusp smaller, distobuccal cusp visible, no 5th cusp
5. C.E.J. profile – irregular
6. Surface contour – convex at cervix, flattens toward cusps
7. Roots – 3 roots visible, lingual longest and narrowest, in foreground. All inclined distally.

C. Mesial aspect
   1. Shape – trapezoidal with cusp tips triangular
   2. Buccal profile – convex at cervix, straight to cusp tip
   3. Lingual profile – evenly convex to cusp tip
      – buccolingual width same as first molar
   4. Occlusal profile – slopes shallow
      – little occlusal surface visible
   5. C.E.J. profile – irregular
   6. Surface contour – slightly convex, similar to first molar
   7. Roots – 2 roots visible, same outline and relationship as first molar

D. Distal aspect
   1. Shape – reverse of mesial
   2. Occlusal profile – distobuccal and distolingual cusps less prominent than in maxillary first molar
   3. Surface contour – smooth and concave at cervical third of crown
   4. Roots – all three roots visible
      a. lingual root – apex in line with the distolingual cusp
      b. distobuccal root – narrower than mesiobuccal root
      c. mesiobuccal root – buccal aspect shows little if any projection beyond the distobuccal root

E. Occlusal aspect
   1. Shape – rhomboidal
   2. Size – smaller distobuccal cusp
      – same rank of large to small cusps as first molar
   3. Buccal surface – convex, converging distally
   4. Mesial surface – slightly concave, converging lingually
   5. Distal surface – evenly convex
   6. Lingual surface – evenly convex
   7. Occlusal surface
      a. Ridges
         mesiobuccal cusp ridge
         distobuccal cusp ridge
         mesial marginal ridge → form triangles
         mesiolingual cusp ridge
         oblique ridge
         distolingual cusp ridge
         distal marginal
         buccal triangular
         lingual triangular

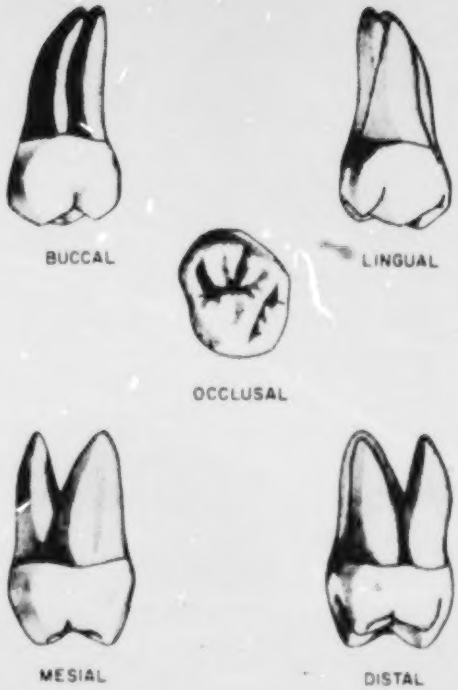
b. Developmental grooves
   - buccal – divides buccal cusps; arises from central pit
   - lingual – divides lingual cusps.
   - oblique – continues lingual groove; runs diagonally between mesiolingual and distolingual cusps to distal pit in distal fossa.
   - central – divides mesiolingual from distobuccal cusps; runs from central pit distally.

c. Supplemental grooves (most commonly found)
   - radiating from central pit
   - in distal fossa
   - randomly found near mesial margin

d. Fossae
   1. central – same as first molar
      – much less area, vague outline
   2. distal – along oblique groove
   3. distal triangular – same as first molar
   4. mesial triangular – same as first molar but much less distinct

XIII. – Maxillary Third Molar

Maxillary molars are sometimes very difficult to describe and/or identify due to their being so variable in size and shape.



Maxillary left third molar

A. Buccal aspect
   1. Size – smallest of the maxillary molars
      – narrower mesiodistally than second molar.
   2. Roots – usually fused together and function as one large root
      – fused apexes tapered, with distinct slant toward the distal

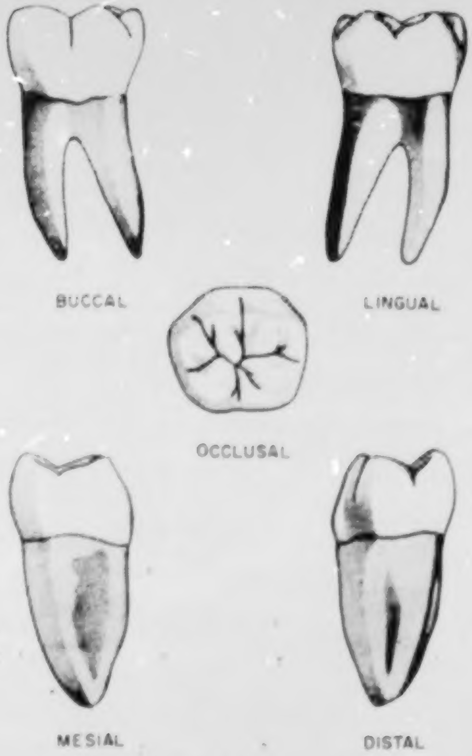
B. Lingual aspect
   1. Mesial/distal profiles – poorly developed distolingual cusp
   2. Roots – lingual root frequently fused to buccal roots

C. Mesial aspect
   1. Roots – poorly developed with irregular outlines
      – fusion of mesiobuccal and lingual roots common

D. Distal aspect
   1. Shape – trapezoidal
   2. Occlusal profile – most of the entire occlusal surface visible
      – shorter distance from cervical line to marginal ridge than in other molars

E. Occlusal aspect
   1. Shape – heart-shaped
   2. Buccal surface – convex, with functioning mesiobuccal cusp
   3. Supplemental grooves – many grooves (varied), unless worn by attrition
   4. Occlusal surface –
      a. Ridges
         mesiobuccal cusp ridge
         mesiolingual cusp ridge
         distobuccal cusp ridge
      b. Developmental grooves
         buccal groove

XIV. – The Mandibular First Molar



Mandibular left first molar

- A. Buccal aspect
  - 1. Shape – trapezoidal
  - 2. Size – normally the largest tooth in mandibular arch
  - 3. Mesial profile – occlusal to middle third – convex
    - – cervical third – concave
  - 4. Occlusal profile – three cusps
    - mesiobuccal
    - distobuccal
    - distal
  - 5. Roots – 2 roots visible
    - a. mesial root – curves mesially to middle third, then curves distally to tapered apex
    - b. distal root – less curved than mesial root
      - – projects distally at apical third
- B. Lingual aspect
  - 1. Shape – trapezoidal
  - 2. Mesial/distal profiles – great cervical convergence
  - 3. Occlusal profiles –
    - a. mesiolingual cusp – higher and more prominent
    - b. distolingual cusp – almost as wide mesiodistally as the mesiolingual cusp
    - c. both mesiolingual and distolingual cusp ridges hide 2 buccal cusps from view
  - 4. Surface contour – smooth on lingual lobes, concave at sides of lingual groove, flattens as it approaches the cervical line
  - 5. Root – 2 roots visible. Lingual widths of roots are less than the buccal widths (by approximately 1 mm).
    - a. mesial root – concave area running vertically on entire mesial surface
    - b. distal root – slight depression

C. Mesial aspect
    1. Buccal profile – slight bulge at cervical third (buccal cervical ridge)
    2. Lingual profile – flat at cervical third, convex to apex of mesiolingual cusp
    3. Occlusal profile – 5 cusps normally visible
        a. mesiofacial – largest
        b. mesiolingual
        c. distolingual
        d. distofacial
        e. distal – smallest
    4. Roots – 2 roots normally visible
        a. mesial root – mesial surface convex at buccal and lingual borders
            – broadest root buccolingually of all molars
            – curves distally
            – has 2 root canals
        b. distal root – much shorter and more pointed than mesial root, curves distally

D. Distal aspect
    1. Buccal profile – reverse of mesial
    2. Lingual profile – convex in middle and occlusal thirds
    3. Occlusal profile – 3 cusps
        a. distobuccal
        b. distal – smallest
        c. distolingual – largest
    4. Roots – 2 visible
        a. distal root – very broad buccolingually
            – blunted apex
            – somewhat narrower than mesial root
            – marked by shallow depression in middle third area
        b. mesial root – lingual border may be seen from distal aspect.

E. Occlusal aspect
    1. Shape – pentagonal or hexagonal
    2. Buccal surface – two-thirds visible, convex
    3. Lingual surface – straight profile
    4. Mesial surface – straight profile, converges lingually
    5. Distal surface – same as mesial
    6. Occlusal surface –
        a. Ridges – 2 lingual cusp ridges largest, more pointed than others
            mesiobuccal cusp ridge
            distobuccal cusp ridge
            distal cusp ridge – smallest

b. Developmental grooves
  - (1) central – runs across center of occlusal surface from mesial pit to distal pit
  - (2) mesiobuccal – intersects central groove
  - (3) lingual – divides the triangular ridges of 2 lingual cusps and extends to lingual surface
  - (4) distobuccal – divides the distal from the distobuccal cusp

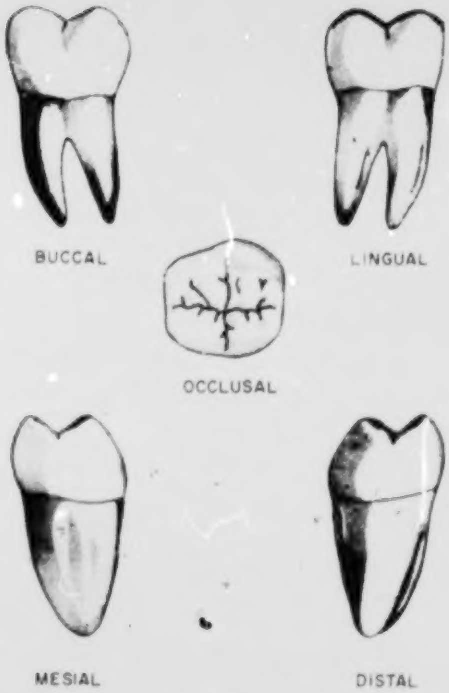
c. Supplemental grooves
  - (1) random on occlusal surface
  - (2) most are tributaries of developmental grooves

d. Major fossa
  - (1) central – bounded by distal slope of mesiobuccal cusp, distal and mesial slopes of distobuccal cusp, mesial slope of distal cusp, distal slope of mesiolingual cusp, and the mesial slope of the distolingual cusp

e. Minor fossae
  - (1) mesial triangular – bounded by mesial slope of mesiobuccal cusp, mesial marginal ridge, and mesial slope of mesiolingual cusp
  - (2) distal triangular – not as prominent as mesial triangular fossa, bounded by distal slope of distal cusp, distal marginal ridge, and distal slope of distolingual cusp

XV. – The Mandibular Second Molar

A. Buccal aspect
1. Shape – rectangular
2. Size – smaller than mandibular first molar but larger than mandibular third molar
3. Mesial profile – uniformly convex
4. Distal profile – concave at cervical third, convex at middle third tapering to occlusal surface
5. Occlusal profile – 2 buccal cusps:
    - mesiobuccal
    - distobuccal
6. Buccal surface – single buccal groove separates the 2 cusps
7. Roots – 2 roots visible
    - a. mesial root
    - b. distal root
    - c. both roots much closer together than in mandibular first molar
    - d. roots curve more distally



Mandibular left second molar

B. Lingual aspect
1. Shape – similar to first mandibular molar
2. Mesial/distal profiles – less cervical convergence
3. Occlusal profile
    - a. distolingual cusp
    - b. mesiolingual cusp
4. Mesial/distal surfaces – not visible
5. Roots – 2 visible
    - a. mesial root
    - b. distal root
    - c. more pronounced distal inclination

C. Mesial aspect
1. Crown profiles – identical to mandibular first molar
2. Root – usually narrower, forms a sharper apex

D. Distal aspect
1. similar to mandibular first molar except for absence of distal cusp and distobuccal groove

E. Occlusal aspect
  1. Shape – rectangular
  2. Buccal surface – straight, single buccal groove
  3. Lingual surface – similar
  4. Mesial surface – less outline curvature than distal (square)
  5. Distal surface – more curvature of outline than mesial, often showing a semicircular outline
  6. Occlusal surface –
    a. Ridges
      mesiobuccal cusp ridge
      distobuccal cusp ridge
      mesiolingual cusp ridge
      distolingual cusp ridge
    b. Developmental grooves
      (1) buccal – separates 2 buccal cusps
      (2) lingual
      (3) central
      (4) all 3 grooves intersect in the middle occlusal surface forming "+4" pattern
        "+" refers to groove pattern
        "4" refers to cusp number
    c. Supplemental grooves
      (1) random on occlusal surface
      (2) most are found coming irregularly from main developmental grooves
    d. Major fossa
      (1) similar to mandibular first molar
    e. Minor fossae
      (1) similar

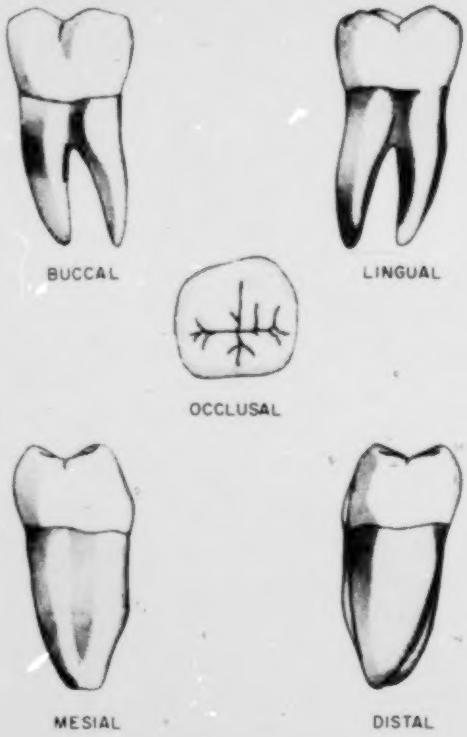
XVI. – Mandibular Third Molar

Mandibular third molars are very difficult to generalize about and/or identify, as they vary from being identical to first and second molars to having no resemblance at all.

A. Buccal aspect
   1. Shape – vary considerably, no definite outline
   2. Size – normally smallest of all mandibular molars
   3. Roots – 2 visible
      a. mesial root
      b. distal root
      c. usually very short, fused, irregularly shaped
      d. distally inclined

B. Lingual aspect
   1. no distinguishable form

C. Mesial aspect
   1. Buccal profile – convex, height of contour at middle third
   2. Lingual profile – same as buccal profile
   3. Root –
      a. broad buccolingually
      b. overall length shorter than other mandibular molars



Mandibular left third molar

D. Distal aspect
   1. Similar to mandibular second molar
   2. Root –
      a. narrowest buccolingually of all mandibular molars
      b. shortest of all mandibular molars

E. Occlusal aspect
   1. Shape – ovoid
   2. Occlusal surface –
      a. 4 cusps similar to mandibular second molar
      b. Developmental grooves – very irregular in direction
      c. Supplemental grooves –
         (1) random to occlusal surface
         (2) numerous, irregularly patterned

Laboratory Exercise – Tooth Morphology

Name ______________________________ Date ____________

1. List the line angles of a permanent maxillary first molar:

2. List 3 embrasures found on a permanent mandibular molar:

3. Define "antagonist" as it relates to dental tooth morphology.

4. What are its two exceptions?

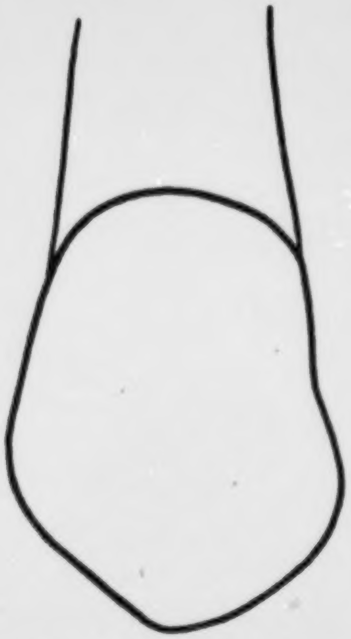
4. The smallest permanent tooth normally found in the mouth is ____________

5. The largest tooth in the mouth is usually the ____________

6. The teeth showing the most variation in anatomical formation are the ____________.

7. The longest root in the mouth is normally found on what tooth?

8. Correctly label the tooth diagram below by marking its divisions into thirds:



Facial View of Maxillary Right Canine

Objectives:

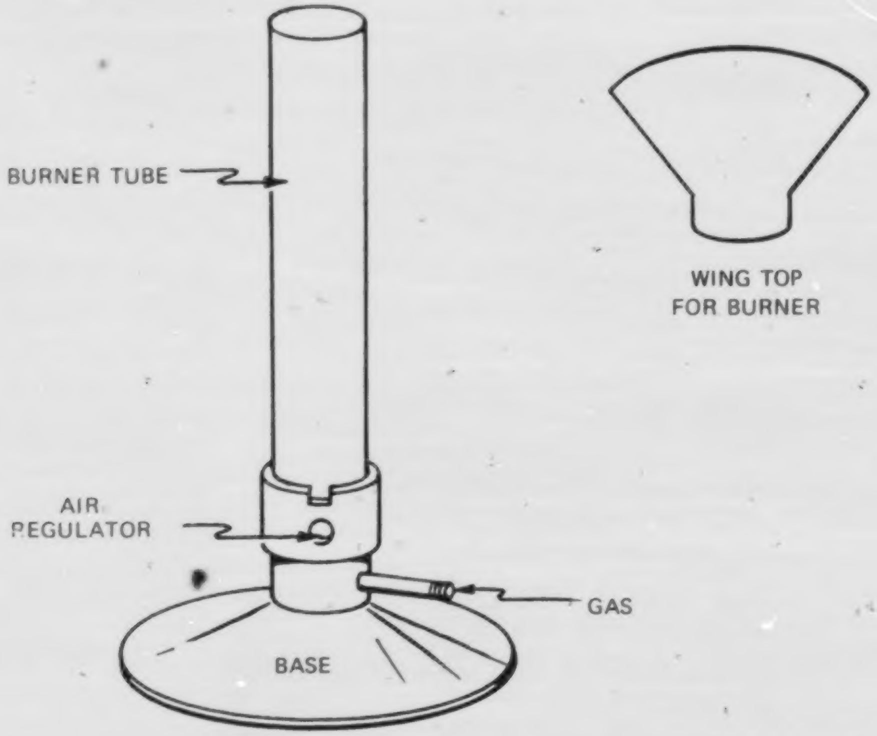
1. Use the laboratory bunsen burner correctly for lab
2. List the flame zones of a bunsen burner.
3. State the differences between bunsen burners and Touch-O-Matic burners.

Equipment

Bunsen burner
Hannau Touch-O-Matic burners
Tubing
Matches

General Laboratory Directions for Bunsen Burner and Hannau Touch-O-Matic

Examine your bunsen burner:

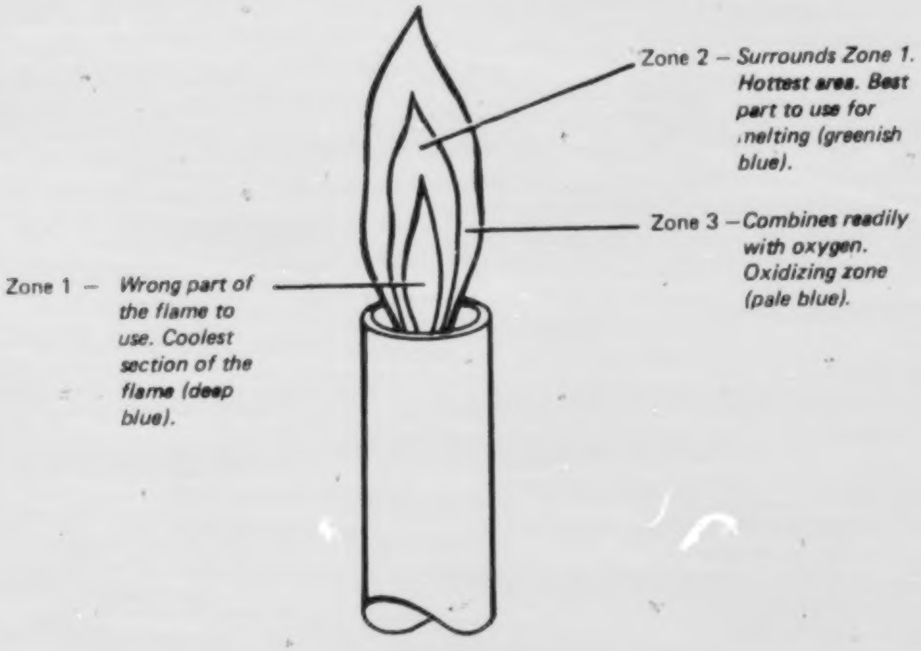


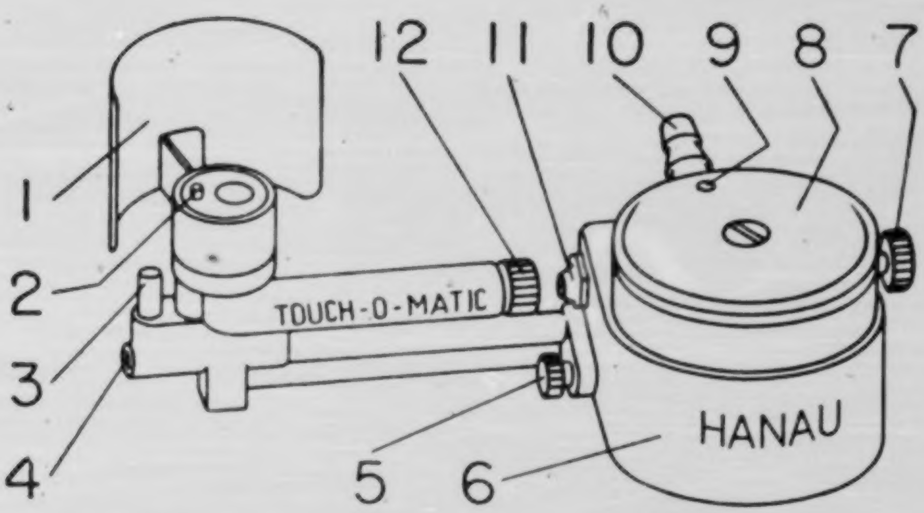
1. Unscrew the burner tube from the base of the bunsen burner to determine the use of each part. Then put the parts together again.

2. Attach the tubing to the bunsen burner and the other end to the gas jet. Turn on the gas jet, ignite, and notice the parts of the flame coming from the top of the burner tube.

3. The air regulator is manipulated by turning it either to an open, partially open, or closed position. A *nonluminous* flame is produced when air is partially closed off or entirely cut off by closing the slot entirely. To obtain the greatest heating effect from the bunsen burner, the slot should be adjusted until two non-luminous areas appear. These areas will be various colors of blue in appearance. These colored areas are referred to as zones, cores, or cones.

4. Try to keep the bunsen burner tubes and base as clean as possible. Wax drippings should be removed immediately so as not to clog either the air regulator or tube.


Zone 2 – Surrounds Zone 1. Hottest area. Best part to use for melting (greenish blue).
Zone 3 – Combines readily with oxygen. Oxidizing zone (pale blue).
Zone 1 – Wrong part of the flame to use. Coolest section of the flame (deep blue).


12
11
10
9
8
7
1
2
3
4
5
6
TOUCH-O-MATIC
HANAU

(1) **Pilot shield**
(2) **Pilot**
(3) **Support for waxing cup**
(4) **Pilot flame adjustment**
(5) **Thumbscrew for detaching burner assembly**
(6) **Valve housing**
(7) **Gas adjustment**
(8) **On-Off Platform**
(9) **Platform indicator**
(10) **Gas hose connection**
(11) **Gas nozzle**
(12) **Air-intake adjustment**

Touch-O-Matic Bunsen Burners

Parts:

1. Pilot shield
   a. Protects the pilot flame from blowing out.
   b. Can be rotated in any desired direction.

2. Pilot light – When lighting the pilot, allow a few seconds for the gas to flow through the tubing.

3. Support piece for wax cup (extra accessory). – Conducts continuous-heat source to cup for softening wax.

4. Pilot flame screw adjustment. – Adjust to keep pilot flame as low as practicable.

5. Thumbscrew for detaching burner assembly. – Thumbscrew can be detached from the valve housing (6) for cleaning purposes.

6. Valve housing. – *Never* submerge this part into water.

7. Gas adjustment. – Regulates the desired volume and height of flame.

8. On-Off platform. – When the pilot is lit, the flame is only produced when this platform is depressed; otherwise only the pilot stays lit.

9. Platform indicator. – When turned out of alinement with the hose connection, allows for continuous flame instead of just the pilot.

10. Gas connection

11. Gas nozzle
    a. Passage for gas and 0_2 to combine to produce flame at far end

    b. May be detached with a wrench for cleaning purposes. *Must be kept immaculate.*

12. Air-intake adjustment. – Regulates the proportion air to gas to obtain a non-carbonizing flame (one that will not combine with carbon).

How to operate:

With pilot burning, and air-gas mixture properly adjusted, the hand holding the instrument or other object to be heated is rested on the On-Off platform, thus creating flame. Remove hand from platform, and the flame goes out and will remain out (except for pilot) until the platform is again depressed.

For a continuous flame, first depress On-Off platform, then turn it slightly in either direction until it is engaged in a down position. The flame will continue until the platform is returned to its original position and becomes disengaged.

Care and cleaning:

To remove wax drippings from burner, remove thumbscrew (5), detach burner assembly from valve housing (6), and place assembly in boiling water. After boiling and before reattaching to valve housing, blow out all water from pilot tube, gas inlet tube, and flame orifice. Make sure that small round packing, attached to projecting brass tubing of burner assembly, is replaced if removed prior to boiling. *At no time submerge valve housing (6) in water.*

Caution:

Observe that opening of gas nozzle (11) is at all times free of wax. If necessary, remove hexagonal nozzle (11) and clean under hot-water faucet.

In the event of leakage at gas adjustment (7), or at gas nozzle (11), gently apply wrench to insure proper seal. Tighten hexagonal nut at (7) against packing within, enough to eliminate gas leakage, but not so much as to prevent the turning of gas-adjustment knob.

If –

(1) after securely tightening gas nozzle (11), leakage continues from the nozzle opening . . . .

Or if –

(2) the bunsen flame fails to shut off automatically when On-Off platform is released . . . .

foreign matter from the gas line may have accumulated, preventing proper seating of the valve. Turn off gas-cock, and remove thumb-cap (with gasket) on the underside of valve housing (6). Remove spring and metal valve (with gasket), and blow out; or, with clean cloth, wipe the valve seat, valve, and gasket. Then carefully and securely reassemble.

Laboratory Exercise – Bunsen Burners

Name ______________________________ Date __________

1. Very quickly insert the head of a match into the central part of the inner zone just above where the gas comes out of the tube. Does the match ignite at once? ______ If not, why not? ______________________________

____

____

2. What does oxidizing mean? ______________________________

____

3. What does carbon do to dental materials? ______________________________

____

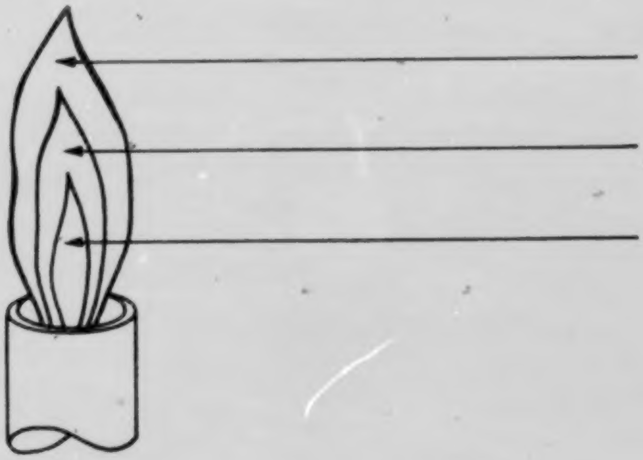
____

4. Why wouldn't you want a carbonizing flame used with the bunsen burner?

____

____

5. Identify the flame zones on the following diagram. Place an asterisk next to the hottest flame zone.



Introduction:

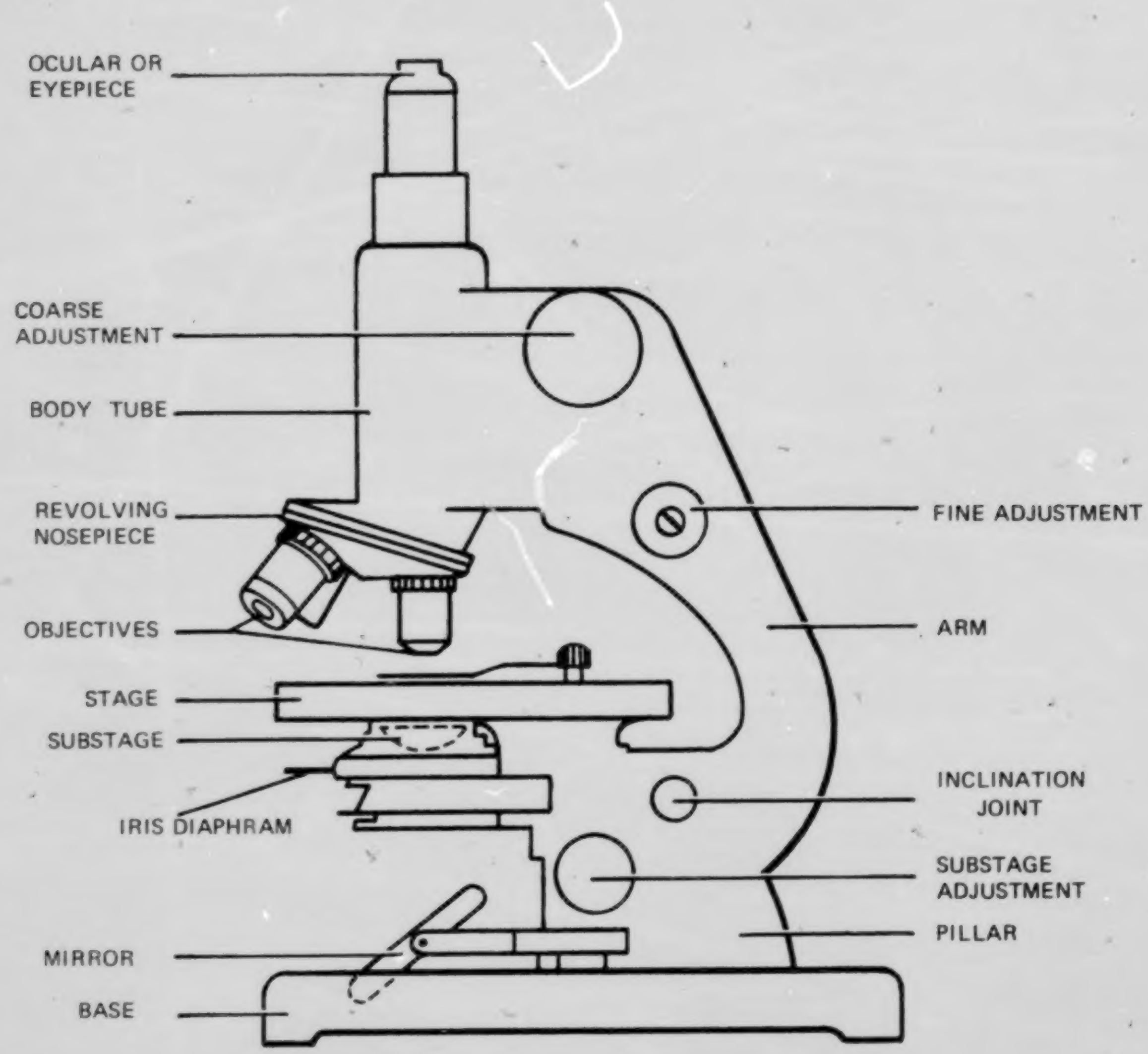
The microscope can be a valuable aid in the dental office, to emphasize conditions of the oral environment that the patient may not be aware of. The dental assistant should have a working knowledge of a compound microscope not only to advance her/his own understanding but also to help develop teaching aids for the patient in a preventive dentistry program.

Objectives:

1. To state the function of and be able to identify on a drawing the parts of a compound microscope.
2. To list procedures necessary for the proper care and carrying of a compound microscope.
3. To state how the microscope can be used as an aid in patient education.
4. To correctly focus the microscope in various experiments, using newsprint, epithelial scrapings, and hair, and draw to correct magnification.

Equipment:

Compound light microscope
Light source
Cotton-tipped applicators (sterile)
Toothpicks
Microscope slides
Coverslips for microscope slides
Newspaper
Human hair (strand)
Aqueous methylene blue


OCULAR OR EYEPIECE
COARSE ADJUSTMENT
BODY TUBE
REVOLVING NOSEPIECE
OBJECTIVES
STAGE
SUBSTAGE
IRIS DIAPHRAM
MIRROR
BASE
FINE ADJUSTMENT
ARM
INCLINATION JOINT
SUBSTAGE ADJUSTMENT
PILLAR

COMPOUND MICROSCOPE

Carefully read the following directions before beginning:

1. In order to work with a microscope the student must become familiar with the essential parts and learn how to focus an object placed on a slide on the stage.

2. The use of the microscope and its parts will be demonstrated by the instructor. After the demonstration, study the microscope carefully, following along with the labeled diagram.

3. In order to complete the laboratory exercises, it is necessary that the student be able to focus an object with the microscope.

4. Complete each portion of the following laboratory exercises and hand in at the end of the laboratory session.

Water mounts

A water mount is a temporary slide mount which will only be used for a single laboratory session. After the student has felt that the objectives have been met, the slide is then carefully washed, rinsed, dried, and returned for reuse at another time.

1. Tear a piece of newsprint (about one-half inch by one-half inch) from a newspaper.

2. Place this newsprint on a clean microscope slide.

3. Apply one drop of water to the newsprint. This will make the newsprint adhere to the slide.

4. Examine the newsprint at both low and high magnifications.

5. Record your drawings on the exercise sheet provided.

6. Repeat this exercise using a small piece of human hair.

7. Record your drawings on the exercise sheet provided.

8. Place a drop of tap water on a clean microscope slide. With a toothpick gently scrape the inside of your mouth, removing some of the lining of your cheek.

9. Place this material in the drop of water on the slide and cover with a glass coverslip.

10. Examine the scrapings at both low and high magnifications.

11. Record your drawings on the exercise sheet provided.

12. Repeat this exercise of the cheek scrapings; however, before placing the coverslip, place a drop of methylene blue on the scrapings and allow to stand for about 5 minutes. This stain should allow you to see structures you were unable to see without the stain.

13. Record your drawings on the exercise sheet provided.

14. Wash, rinse, and dry all slides and return to the proper receptacle.

15. Complete the questions at the end of this exercise.

Laboratory Exercise – Compound Microscope

Name ______________________________ Date ______________

1. The ____________________ moves the slide across the stage.

2. The microscope slide is always placed on the ____________________.

3. What would happen if you lowered the body tube without watching the objective lens? ______________________________

____

____

4. Why must an object be transparent to be visible under the microscope?

____

____

____

State briefly the functions of each of the following parts of a compound microscope:

5. ocular ______________________________

____

6. base ______________________________

____

7. stage ______________________________

____

8. mirror ______________________________

____

9. objectives ______________________________

____

10. fine adjustment ______________________________

____

11. Label the parts of this diagram of a compound microscope on the appropriate lines:

A. ____________________

B. ____________________

C. ____________________

D. ____________________

E. ____________________

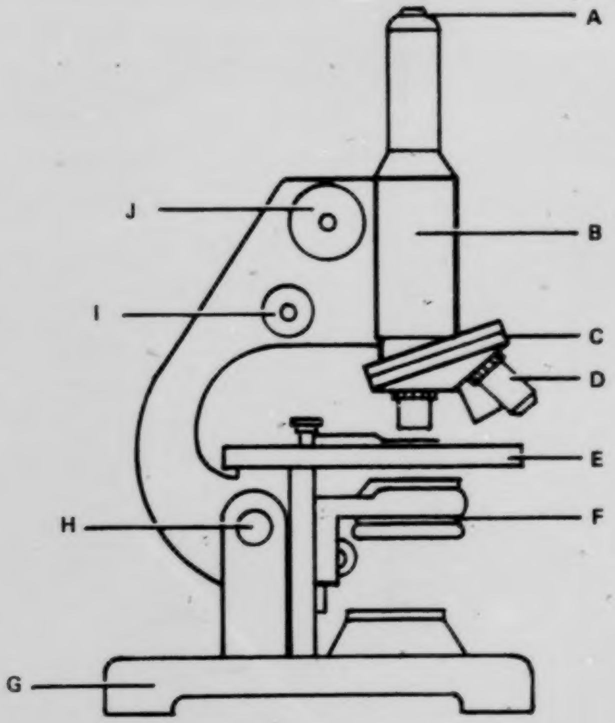
F. ____________________

G. ____________________

H. ____________________

I. ____________________

J. ____________________



12. Take a sample of newspaper print, human hair, and buccal scrapings for viewing under the microscope. View each sample under two different magnifications and place drawings of each where provided on the exercise sneets. Be sure to state the magnification power used for each sample.

Newspaper print

Magnification ______X

Magnification ______X

Human hair

Magnification ______ X

Magnification ______X

Buccal scrapings (unstained)

Magnification _____ X

Magnification _____ X

Buccal scrapings (stained)

Magnification _____ X

Magnification _____ X

Introduction:

It is the purpose of this laboratory exercise to introduce the student to a measuring device designed to make precision measurements in the field of dentistry. The Boley gage is frequently used in prosthodontics (fabricating dentures).

Study the following instructions, which explain the use and operation of the Boley gage.

Objectives:

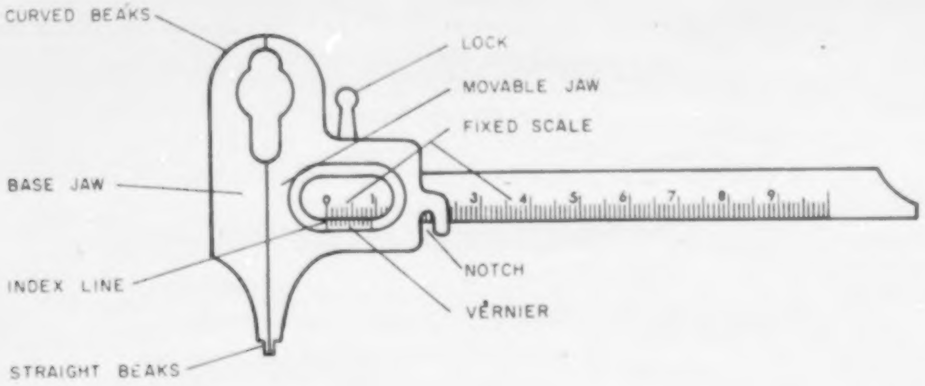
1. Given a diagram of a Boley gage, correctly identify its parts from memory.
2. Given examples and illustrations of Boley gage readings, correctly give the measurements in centimeters to an accuracy of 0.01 cm (0.1 mm).
3. Correctly measure the dimensions of variously shaped items with the Boley gage to an accuracy of a tenth of a millimeter.

Equipment:

Boley gage
laboratory jar
typodont
paper
exercise sheets

Use of the Boley Gage

The figure below is a Boley gage, also referred to as a caliper rule. It is a measuring tool with one scale on a straight bar, on which a second scale slides. It is used to measure the dimensions of teeth and other related items.



The two main parts of the gage are the **fixed scale or bar** and the **movable jaw**. The bar consists of a base jaw attached to a fixed scale. The movable jaw consists of the movable portion and a lock.

The window area of the gage has a small, removable scale running parallel to the fixed scale; this is called the **vernier**. A vernier is used to measure a fractional part of one of the small divisions of the fixed scale.

Numbers read on the fixed scale are read as units (in this case, *centimeters*). Each *line* represents *a tenth of a centimeter*, or *one millimeter*. The vernier reading is in *hundredths of a centimeter*, or *tenths of a millimeter*.

Example: 3.54 centimeters means

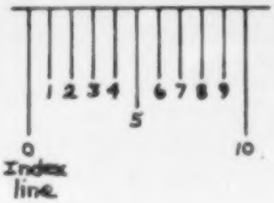
3. = 3 centimeters (or 30 millimeters)
0.5 = 5 tenths of a centimeter (or 5 millimeters)
0.04 = 4 hundredths of a centimeter (or 0.4 millimeters)

The **notch** acts as a resting point for the thumb while measuring the dimensions.

The **lock** holds the jaws in place so that an exact reading can be taken.

The **straight beaks** are used for measuring outside diameters and convex ├─┤ curvatures. The **curved beaks** are used for measuring concave)─(diameters.

The **index line** is the first line of the vernier. The index line is also referred to as the **zero guide**. Ten spaces on the vernier scale equal only nine spaces on the fixed scale. Although the vernier does not have numbered markings, the student must know that each line represents a number, as illustrated below:



233

How to read the Boley gage

1. Place the Boley gage with the markings facing you. Make sure the rule can be easily seen.

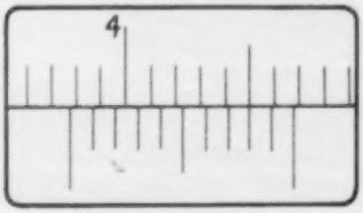
2. Place your thumbnail in the notch.

3. Fit the jaws over the object being measured.

4. Hold the base jaw against one side of the object and push the movable jaw until it touches the opposite side of the object.

5. With the index finger, tighten the lock by pulling in the direction of the notch.

6. The fixed scale has numbers on it beginning with 0 and going through 0 (which is actually 10). Write down *the first number to the left of the index line.* Place a decimal point to the right of this number. (Example: 3. cm)

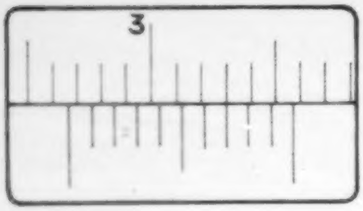


7. Now count the number of whole spaces on the fixed scale from that number to the index line. Write down the counted number of spaces to the right of your decimal point. (Example: 3.7 cm)

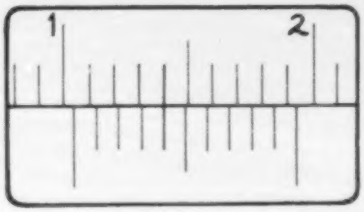
8. Finally, count the divisions to the right of the index line on the vernier until a line on the vernier *exactly coincides* with a line on the fixed scale. Place this figure to the right of the fixed-scale number. (Example: 3.78 cm)

9. If the index line is to the right of any line on the fixed scale, it indicates a fraction (in tenths of a millimeter); if the index line happens to be *directly* under any line of the fixed scale, there is no fractional part of a millimeter, and the number will have a zero in the second decimal place. (Example: 2.40 cm)

The following illustrations will help you understand how to read the Boley gage:

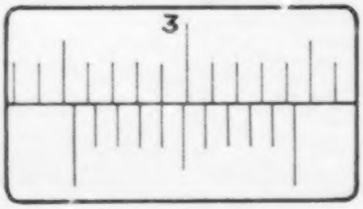


2.67



1.04

Adjust your Boley gage to read 2.54. Then check your setting with the illustration below:



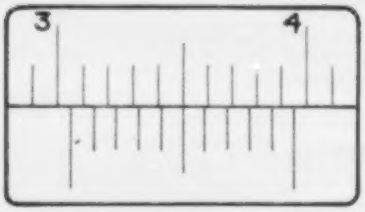
2.54

Laboratory Exercise – Boley Gage

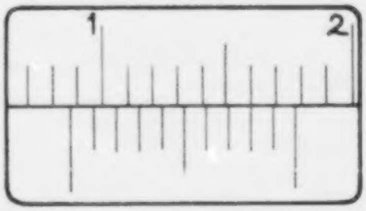
Name ______________________________ Date ______________

Complete the following laboratory exercises. If necessary, review the previous information before continuing further.

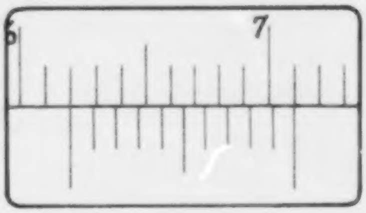
1. Read the following Boley gage readings and place the correct answer in the space provided to the right of each illustration. Be sure to correctly label all answers.



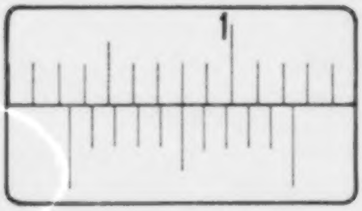
Answer ______________________



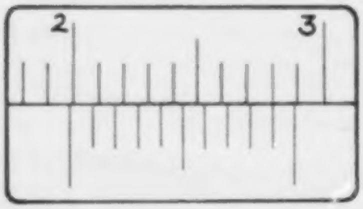
Answer ______________________



Answer ______________________



Answer ______________________



Answer ______________________

2. Obtain a glass laboratory jar from a laboratory box. Using the Boley gage, measure the following aspects and record below. Label all measurements in the proper unit.

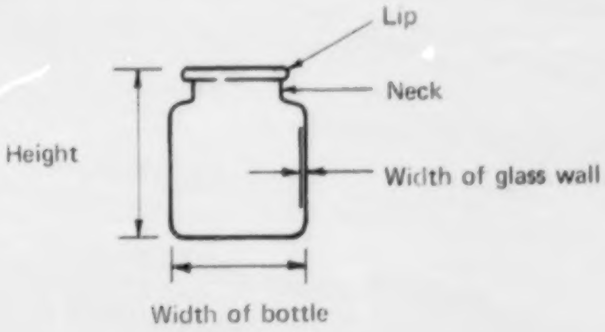
Overall height of bottle ____________________

Width of bottle ____________________

Width of bottle at lip ____________________

Width of bottle at neck ____________________

Inside diameter of bottle at the lip ____________________



3. Obtain a typodont. Using the Boley gage, measure all aspects of it, as specified below, and record each in the appropriate space. When this exercise is completed, attach the typodont used (in a small coin envelope), and hand in with your name and date filled in. Label all measurements in the proper unit.

Tooth Number __________ Arch ________________

a. Length of crown ________________

b. Length of root ________________

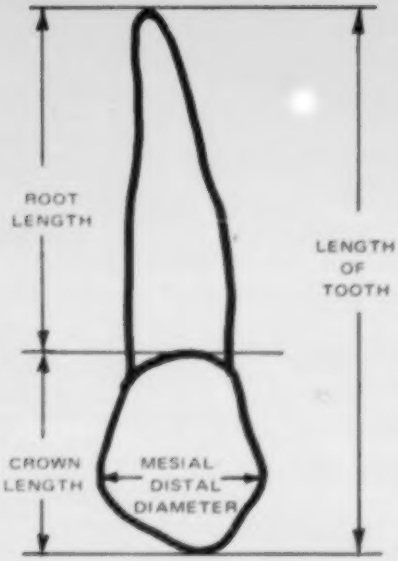
c. Mesial-distal diameter of crown ________________

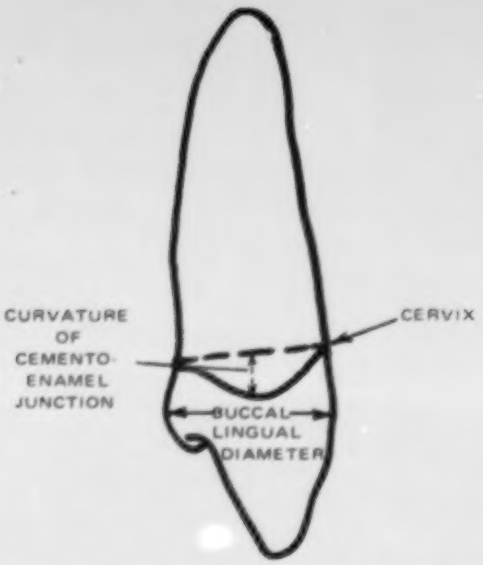
d. Mesial-distal diameter of crown at cervix ________________

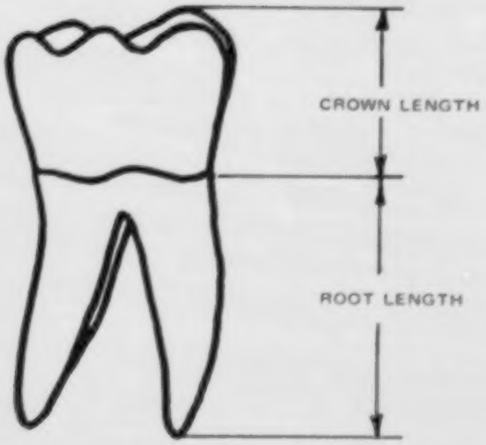
e. Buccal-lingual diameter of crown ________________

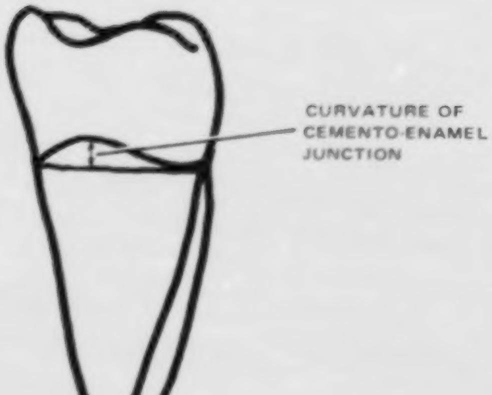
f. Buccal-lingual diameter of crown at cervix ________________

g. Curvature of cemento-enamel junction of the mesial surface ________________


ROOT LENGTH
LENGTH OF TOOTH
CROWN LENGTH
MESIAL DISTAL DIAMETER


CURVATURE OF CEMENTO-ENAMEL JUNCTION
CERVIX
BUCCAL LINGUAL DIAMETER


CROWN LENGTH
ROOT LENGTH


CURVATURE OF CEMENTO-ENAMEL JUNCTION

Objectives:

1. After being given a demonstration and no more than two practice times, collect all the necessary equipment and correctly fabricate an acceptable copper-band impression of a prepared typodont tooth.

Equipment:

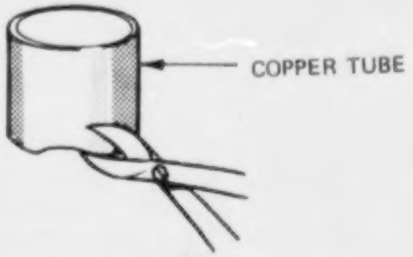
Bunsen burner
Matches
Cement spatula
Impression compound material
Contouring pliers
Untrimmed (annealed) copper bands
Curved crown and bridge scissors
Rubber impression material
Mixing pad
Typodont with prepared tooth (die)
Vaseline lubricant

Directions for Fabricating a Copper-Band Impression

1. Apply a thin coat of vaseline to the typodont to prevent the rubber-base impression material from eroding the plastic-base portion of the typodont.

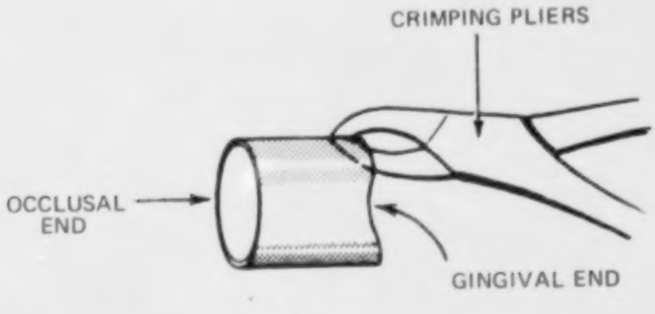
2. Select an annealed copper tube that is slightly larger than the prepared tooth. Several bands may have to be tried over the prepared tooth before the proper size is found. The band may be flattened easily with finger pressure to help it conform to the proximal surfaces of the prepared tooth.

3. Contour the selected copper tube to the gingival margin of the prepared tooth by cutting with curved scissors. When trying the band on the prepared tooth, it should project slightly beyond the prepared margin of the tooth.



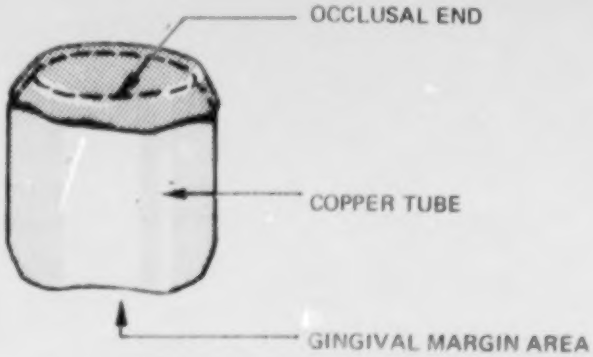
4. Using a sharp instrument, scratch the buccal or lingual surface of the copper tube to establish a reference point for replacing it. (Just be sure to remember which surface was marked!)

5. Once the copper tube is adequately contoured, crimp (bend) the gingival end with contouring pliers. The bending of the tube should be within 2 mm of the end of the tube and turned in so it closely fits the prepared tooth along the entire gingival margin. Carefully crimp the occlusal end of the tube, avoiding distorting the tube by applying too much pressure to it. This aids in the retention of the compound stop.



6. Thoroughly soften a stick of impression-compound material over a bunsen-burner flame. Avoid heating it for too long a period, as it will melt and there is a danger of

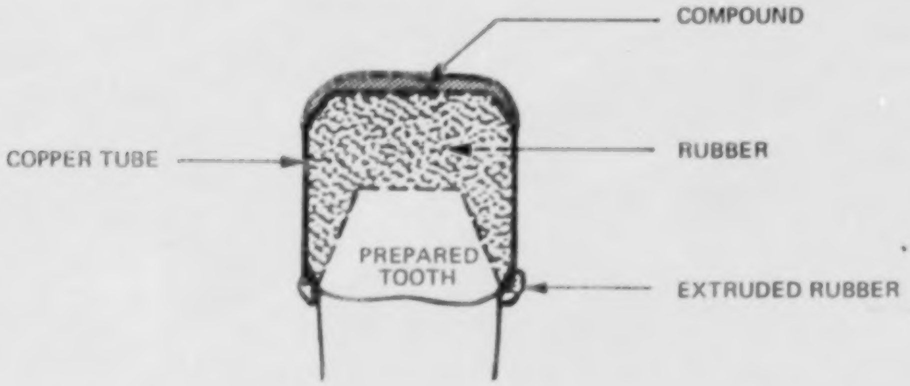
being badly burned by the hot material. Moisten the fingers with water or vaseline and remove enough softened compound to form a disk about one-fourth inch thick and slightly larger in diameter than the occlusal end of the tube (see diagram.) Place this disk over the occlusal end of the tube, folding the impression compound around the crimping. This seals off the occlusal end of the tube.

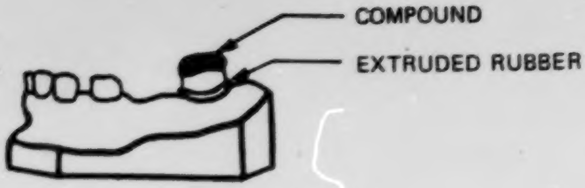


7. Replace the prepared copper tube over the prepared tooth to recheck the fit and make sure the compound does not touch the prepared tooth; this would interfere with the actual tube impression. If the compound has been pressed too far into the tube, use a warmed spatula to remove the excess material.

8. According to the manufacturer's directions, dispense correct amounts on the mixing pad of the impression material to be used for the impression. Using a cement spatula, mix the material to a homogeneous mix according to the manufacturer's directions. Gather up the mixed material onto the spatula and transfer it into the copper tube until it is completely filled; however, do not overfill. Care must be taken when filling the tube not to trap air into it.

9. Press the filled tube firmly into place until the gingival margin area has been completely covered by the band. Rubber impression material will extrude from the gingival end of the tube. Hold the tube steady for a *minimum* of 8 minutes. Do not remove the extruded amounts, as this material can be used to check the setting of the material inside the copper tube. (Final set will probably not occur as rapidly as it would if in the patient's mouth.)





Copper Tube Seated on Typodont

10. When removing set-tube impressions, gently apply a pulling pressure, and the tube should lift off with little difficulty.

11. The impression material should be free of voids and show all gingival margin detail.

12. Upon completion, hand in the copper-tube impression and criteria sheet for evaluation. Copper tube should be placed in a small envelope with the student's name and date on it.

Criteria Sheet for Copper Band (Tube) Impressions

Name ______________________ **Date** ____________

	Possible	**Score**
1. Tube fits prepared tooth correctly (crimping)	15	____
2. Tube contoured correctly	20	____
3. Compound material properly applied to the tube	10	____
4. Compound does not interfere with prepared tooth	20	____
5. Impression material mixed correctly	10	____
6. Impression taken with:		
no voids	20	____
1-3 voids	15	____
4-6 voids	10	____
7 or more voids	5	____
Name of student and date on envelope	5	____
TOTAL SCORE	100	____

Comments: ______________________________

Topic 19 — Fabrication of Study Models

Introduction:

Study models are constantly used in the dental profession as a diagnostic aid for patient-case evaluation, particularly in orthodontic, pedodontic, and prosthodontic offices.

The dental assistant must be able to carefully measure the materials to obtain accurate water-to-power ratios, correctly fabricate the study casts, and trim these models to the specifications of the dentist.

Objectives:

1. Correctly assemble the necessary armamentarium to fabricate both mandibular and maxillary study models.
2. Correctly weigh and measure (using the correct water/powder ratio) the dental plaster and water needed for the fabrication of diagnostic study models.
3. Given the necessary armamentarium, and within a maximum of five practice sessions, correctly fabricate an untrimmed diagnostic study model having a one-half inch base height and no voids.

Equipment:

Rubber bowl
Spatula
Room-temperature water
Dental plaster
Alginate impressions
Vibrator
Graduate
Scale and/or balance
Work tile
Pencil

Fabrication of Plaster Study Models

Read all directions carefully before beginning. A demonstration will be given to you prior to your undertaking this work.

1. Assemble the armamentarium.

2. Prepare the alginate impression.

   a. Remove saliva and debris by flowing a thin, watery "slurry" mix of plaster over the impression. Rinse gently under running water.

   b. Remove excess moisture from the impression with a quick, moderate blast of air.

3. Mix plaster to the manufacturer's specifications.

Classification	Dental Plaster
Gypsum product	Plaster
Trade name	Model Plaster
Color	White
Water/powder ratio	50ml/100 g
Crushing strength (wet)	3000 psi*
Crushing strength (dry	6000 psi*

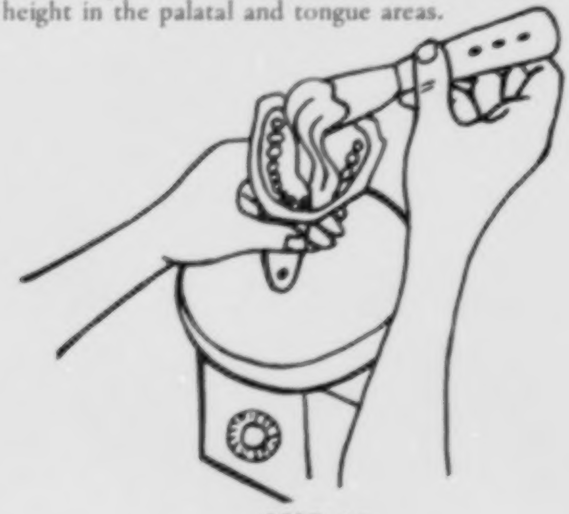
* pounds per square inch

4. Hold the impression on the vibrator in a slightly tilted position to facilitate a gentle flow of plaster. Use a spatula to pick up a small quantity of mix at a time.

   a. On the maxillary, impression mix is flowed from the palatal area into the tooth indentations and ridge areas. Start flowing plaster on one side and work systematically around to other side until the whole area is filled. Flow *slowly* to avoid trapping air.

   b. On the mandibular, again the material is added at one end of the arch (the heel area) and gradually flowed to the other side until all tooth indentations and the alveolar ridge are filled.

5. Add enough additional plaster onto the work tile to make a base approximately one-half inch in height in the palatal and tongue areas.



6. Allow the model to set until hard. (Usually 6-10 minutes for the initial set, 15-20 minutes total for the final set).

7. Clean all equipment used so far.

8. After the final set, separate the impressions from the study casts. Do this gently so as not to break off teeth or injure the cast in any other way.

9. Clean impression trays and place them in cold disinfectant for reuse at a later time.

10. Of the five sets of diagnostic study models you have fabricated, choose the set you feel to be your best effort (smallest number of voids, correct base height, good reproduction and detail) to hand in for evaluation with the criteria sheet. These will be returned to you for the model-trimming exercise.

Criteria for Untrimmed Study Models

Name ______________________ Date ____________

Note: Student may submit only one set of diagnostic study models. These will be evaluated and then returned for the model-trimming exercise.

			Possible	Score
* 1.	Voids		20	
	None	20		
	1-3	15		
	4-7	10		
	8 or more	5		______
2.	Reproduction of detail – clearly defined tooth areas			
	Maxillary		10	______
	Mandibular		10	______
* 3.	Base height one-half inch			
	Maxillary		15	______
	Mandibular		15	______
* 4.	Fractures or broken teeth		20	
	None	20		
	1-3	15		
	4-8	10		
	9 or more	5		______
5.	Plaster mix correctly made, using correct water/powder ratio		10	______
			TOTAL SCORE	______

* Crucial performance items.

Objectives:

1. Correctly trim your previously evaluated study model casts to the specifications of the study-model trimming procedures.

   Note:While using model trimmers, *all* students ***must wear safety glasses at all times.***

2. Trim other diagnostic study models to an acceptable level in the dental clinical field (acceptable level is the dentist's personal criteria.)

3. Polish the trimmed study models correctly.

Equipment:

Untrimmed diagnostic study models
Model trimmer
Millimeter rule
Safety glasses
Pencil

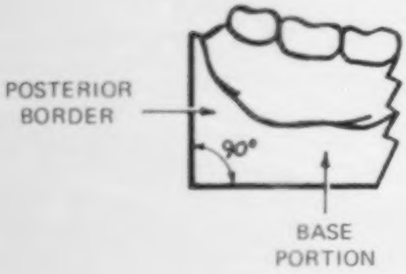
Study-Model Trimming Procedure

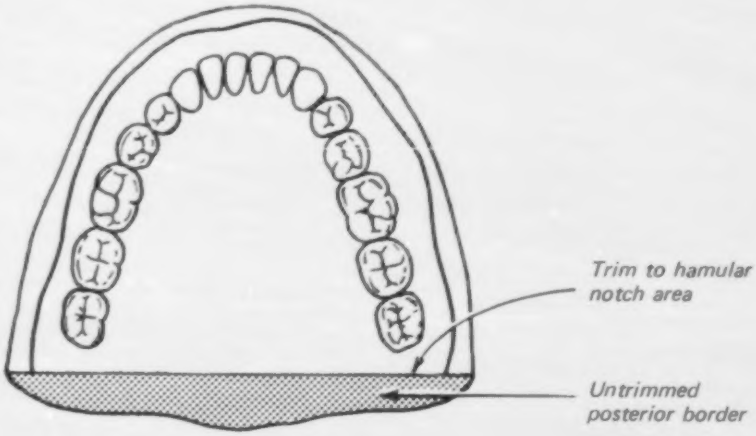
Cutting procedures:

1. Reduce all gross (excess) plaster from the untrimmed fabricated models. If this excess plaster were not removed, it would be impossible to articulate the two casts.

2. Cut the base of the mandibular cast parallel to the occlusal plane. The base should be one-half inch thick in the area where the tongue is blocked out.

3. Trim the posterior border of the mandibular cast by marking a straight line between the two hamular notches and cutting along this line. The cast is trimmed to this guideline, at right angles to the base.

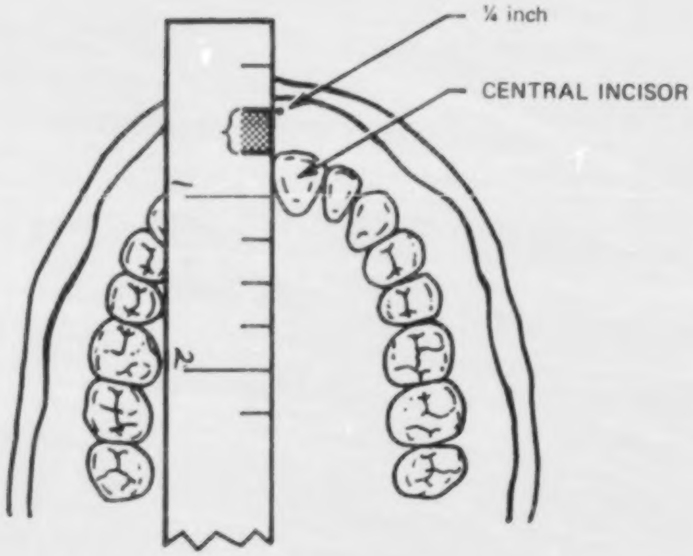




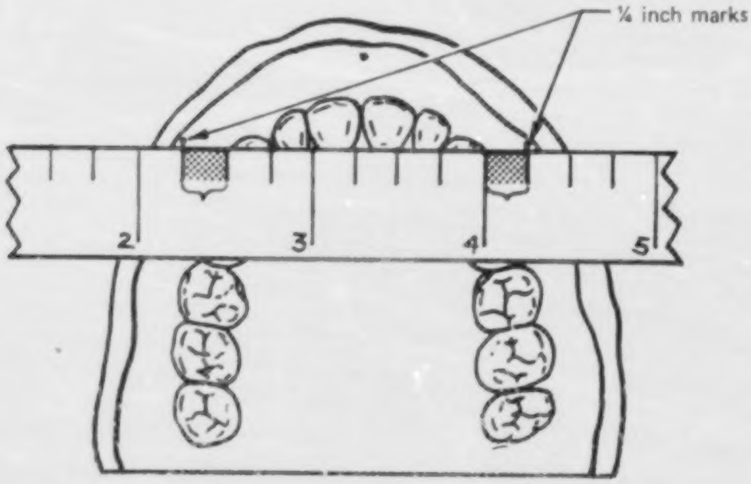
4. Occlude the mandibular and maxillary casts and cut the back of the maxillary cast to the back of the mandibular cast.

5. Occlude and set cast on the back heels. Then cut base of maxillary cast parallel to base of mandibular cast. Base should be at least three-quarters of an inch thick in the palate area.

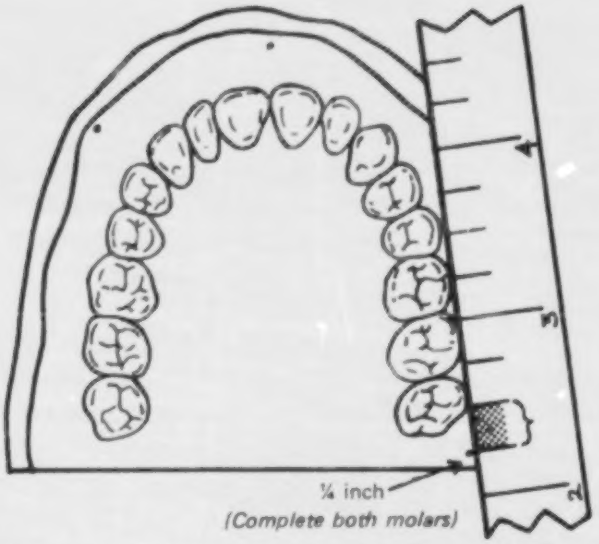
6. Place maxillary cast on a flat surface. Place ruler perpendicular to the back cut and through the median line of the two central incisors. With a pencil place a mark one-quarter of an inch from the facial surface of the central incisors.



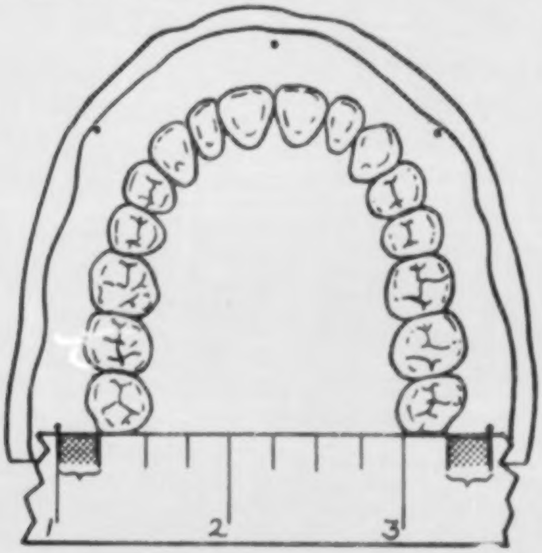
7. Rest the ruler on the occlusal surface, keeping it parallel to the back of the cast. Still keeping it parallel, move the ruler until it bisects the tips of the canines. Place a pencil mark one-quarter of an inch from the facial aspect of each canine.



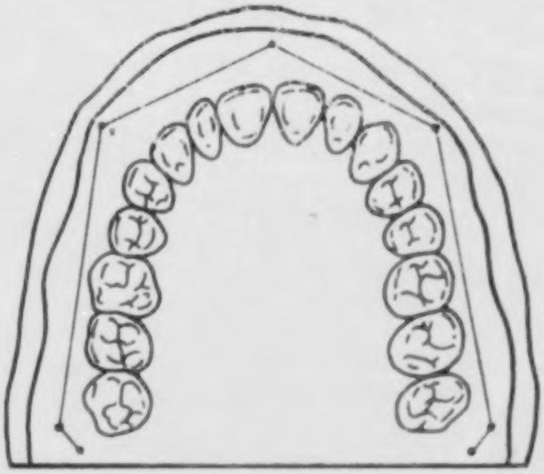
8. Another mark must be placed one-quarter of an inch distal to both third molars. (Hold the ruler parallel to the muco-buccal fold.)


4
3
2
¼ inch
(Complete both molars)

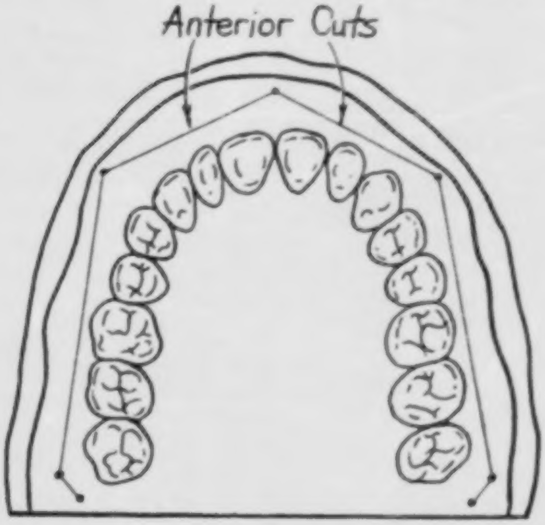
9. Another pair of pencil marks must be made one-quarter of an inch beyond the distobuccal corners of the third molars.



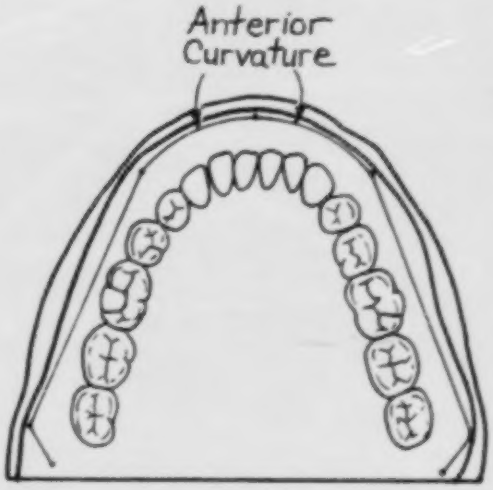
10. After completion of the pencil marks, connect all the marks as shown.



11. The mandibular cast is prepared in the same manner except that there is an anterior *curvature* instead of straight anterior cuts.

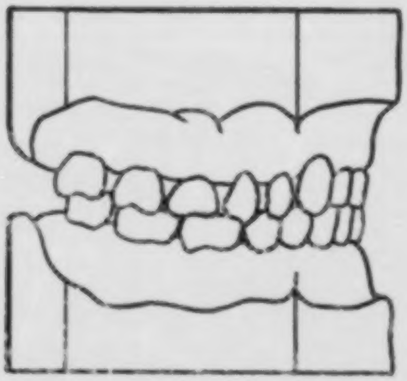


MAXILLARY CUT LINES



MANDIBULAR CUT LINES

12. Soak the trimmed study models in study-model soap for about 15 minutes. Dry and then buff them to a high gloss. Be sure name and date are placed on both casts before handing in for evaluation.



Criteria for Trimmed Study Models

Name ____________________________ Date ______________

	Possible	Score
*1. Backs are parallel when study casts are set on heels and occluded.	20	
*2. Heels are also parallel on both casts when occluded.	10	
Maxillary		
*3. Anterior cuts – angles at central incisors	13	
*4. Anterior cut – angles at each cuspid	10	
*5. Buccal cut parallel to buccal surface	10	
*6. Base is one-half inch thick in palatal area	5	
Mandibular		
*7. Anterior cut arches symmetrically from cuspids	10	
*8. Buccal cut parallel to buccal surface	10	
*9. Base is one-half inch thick in tongue area	5	
10. Casts are polished correctly	3	
11. Name on each cast	2	
12. Date on each cast.	2	
TOTAL SCORE	100	

* Crucial performance items

Introduction:

Bacteria are classified as pathogenic (harmful because they invade animal tissue) and nonpathogenic (harmless, or even useful because they perform functions which help man). Without the bacteria of decay, decomposition of organic materials could not occur, free nitrogen could not be released to the air, and we would live in a world of garbage. Since bacteria are one of the main causes of dental disease, the dental assistant should become more aware of bacteria and the importance of such procedures as sterilization, disinfection, and general sanitation in making sure that the dental office does not unwittingly increase the problem of bacterial infection.

Objectives:

1. Collect and organize all necessary equipment to obtain bacterial cultures.
2. Correctly inoculate a petri dish of nutrient agar without contamination.
3. Define the terms: culture media, petri dish, smear, and agar as they relate to this technique.

Equipment:

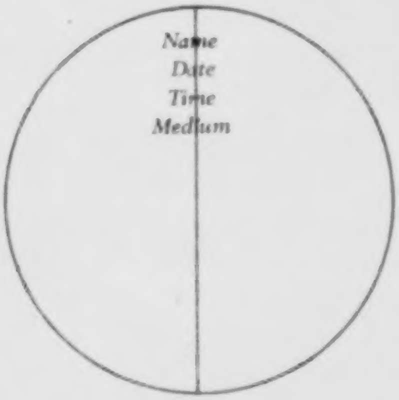
Petri dishes with prepared nutrient agar
Sterile cotton-tipped applicators
Grease pencil (china marker)

Read all directions carefully before beginning this exercise. A demonstration will be presented initially, after which you will begin your own experiments and assignment.

Caution: *At no time should the cover lids to the petri dishes be fully opened.* Petri dishes should be stored in an upside down position to prevent condensation from contaminating the nutrient agar.

1. Obtain the nutrient agar dishes (preferably two tomato-juice agar and one Mitis Salivarius.) Turn the dishes over *without opening the cover lids.*

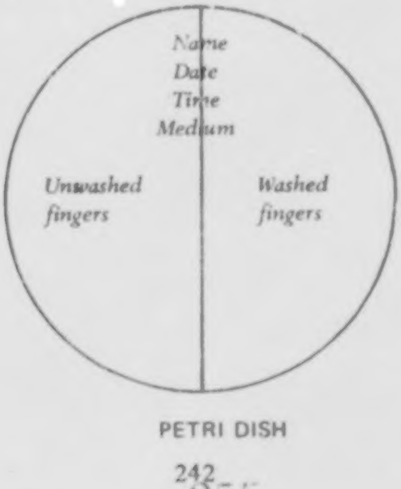
2. Divide the petri dishes in half by marking the bottom of each dish with a grease pencil. Again, caution should be taken not to allow the cover lids to open. Write your name, date, time, and medium on the bottom. There will be enough space on each side to write in topic and/or contamination entry.



PETRI DISH

3. Place one of the dishes on table and open the lid as little as possible. Lightly press your fingertips on the agar and quickly close the lid. Note this with a grease pencil on back (i.e., Unwashed fingers). Care should be taken not to contaminate the opposite side of the dish.

4. Carefully wash hands for approximately one minute. Repeat procedure on other half of petri dish and note "Washed fingers."



PETRI DISH

5. Obtain a sterile cotton-tipped applicator and another agar dish with medium. Swab the inside of your mouth and, carefully keeping the lid closed as much as possible, gently run the applicator across the medium. Label on the bottom: date, name, time, medium, and "mouth swab."

6. Allow the other half to be your control side. Do not disturb this side at all. It will be used for comparison.

7. In the last petri dish use your own imagination for obtaining bacteria. Examples which may be used are: hair samples, floor dust and dirt, desk-top dirt, outer ear swabbing, navel swabbing, etc. Be sure to label correctly.

8. When completed, return all petri dishes to the instructor for incubation for at least 24 hours at body temperature (37°C).

9. Activities and exercises are based on the results after incubation.

10. Complete your observations and conclusions when you observe the inoculated and incubated cultures.

Laboratory Exercises – Bacteria Cultures

Name ________________________________ Date ____________

List the necessary equipment needed to take a swab culture of bacteria within the mouth:

1. ____________________ 3. ____________________

2. ____________________ 4. ____________________

5. What is the name given to harmless bacteria? ____________________

6. Why is it so important to keep the cover lids on the petri dishes as much as possible?

____

Examine the petri dishes after the 24-hour period at body temperature and:

7. Describe each inoculated section and compare it to its control:

   a. Finger tips: ________________________________

   ____

   b. Mouth swab: ________________________________

   ____

   c. ____

   ____

8. Which dish appeared to have the most growth? Why? ____________________

____

____

9. Did your control sections remain sterile? ____ Why? ____________________

____

____

10. How can the preparation of petri dishes with agar nutrient be related to mouth swabbing of dental patients in a patient-education program?

____

____

Introduction:

The Snyder Test is sometimes used in the dental office to determine the extent of acidogenic (acid-forming) bacteria activity found within a patient's saliva sample. A colorimetric table indicates the amount of acid production by the salivary microorganisms in a carbohydrate medium. This test helps to determine the etiology (complex of causes) of dental caries and also helps to evaluate the patient's daily diet intake (as far as carbohydrate consumption is concerned).

Objectives:

1. Given all the necessary equipment, perform an acceptable Snyder Test on an individual and evaluate the results over a 4-day period of incubation.
2. Determine colorimetrically the metabolic activity of acidogenic bacteria in a saliva sample and record your results on a chart.
3. Interpret the results as they relate to food habits.
4. As a practical application of patient education, explain to the patient in your own words the Snyder Test procedure and then perform the test on same patient.

Equipment:

Agar-medium test tubes (containing Snyder Test agar, Bromcresol green)
Incubator
Explorer
Mouth mirror
Paraffin
Sterile petri plates
Sterile plastic pipettes
Hot-water bath

Carefully read the directions before beginning:

1. Explain to patient procedure used for Snyder testing prior to beginning.

2. Collect about 1 ml of saliva by having the patient chew a piece of paraffin for approximately 3 minutes and expectorate all collected saliva into a sterile petri dish (or other sterile collecting container). This procedure is referred to as a stimulated-flow saliva collection.

3. Using a sterile plastic pipette, add 0.1 ml of saliva to each of two test tubes containing the Snyder Test agar. (NOTE: The sterile pipettes hold 1.0 ml, with marks at each 0.1 ml. Draw to any mark and allow a flow from that mark to the next lower; this will dispense 0.1 ml.)

4. Melt the medium by placing the test tubes into a hot-water bath for approximately 5 minutes.

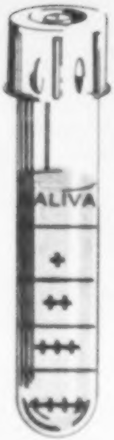
5. Allow test tubes to cool to about 45°C (just warm enough to touch).

6. Allow test tubes to solidify by standing at room temperature for 20 to 30 minutes.

7. Incubate test tubes at 37°C. for up to 72 hours.

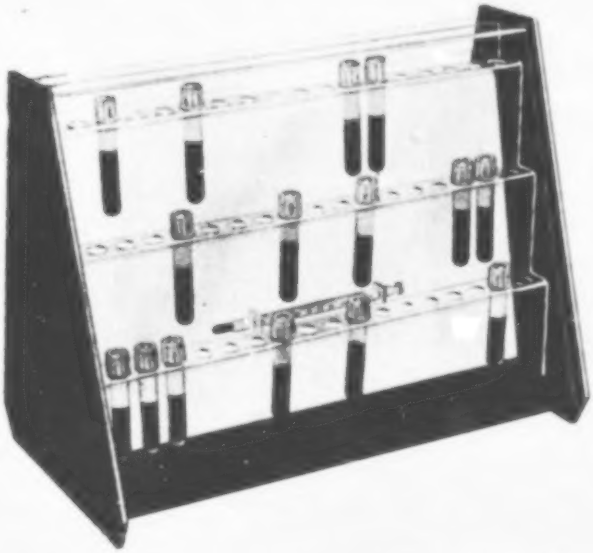
8. These test tubes must be examined daily for 3 days and color changes recorded on the enclosed worksheet. The color will change from the bluish-green of the original medium to green to yellow, corresponding to: pH 4.6 to 4.8. 4.2 to 4.6; and 4.2 or lower, respectively.

CORRELATION OF MODIFIED SNYDER RESULTS TO APPROXIMATE LACTOBACCILLUS COUNTS PER ML. SALIVA.



(Thousands (000) omitted)

	HOURS			
	24	48	72	96
+	15	10	5	2
++	25	15	10	5
+++	50	25	15	10
++++	100	50	25	15



INCUBATOR

YOUNG *Dental Manufacturing Company*

Observations:

1. The Snyder Test permits a visual and easy assessment of the acidogensis in saliva, thus providing a general idea on the degree of caries-conduciveness of the patient's oral environment.

2. The Snyder Test can be used as a check for the patient's diet survey. Some people report in their diet what they think they should eat but not what they actually eat (this is particularly true with children's parents). When, for example, the diet includes substantial amounts of fermentable carbohydrates, particularly snacks (and these are not reported), the Snyder Test, which in these cases will be very likely highly positive, suggests the consumption of large amounts of carbohydrates and thus pinpoints the discrepancy between the patient's report and the real diet.

3. The Snyder Test may be used to establish a historical record. On each office visit, a Snyder Test is given, and the reading compared with the patient's record. Thus any changes in the oral environment may be quickly noticed. If a change has developed, this should be a warning to the dentist that a possible caries-developing situation is occurring. (Example, return to improper brushing or a diet change).

*4. In trying to motivate a patient to change his oral habits, particularly to reduce sugar ingestion in order to reduce caries incidence, the Snyder Test will show whether or not the patient is able to attain this goal within a few weeks. In contrast, the actual observation of a decrease (or total cessation) in caries formation will take several months to a couple of years, due to the slowness of the carious process. Instead of the promise of an intangible, somewhat distant condition of better dental health, the Snyder Test offers the possibility of rather immediate, concrete, and very graphic results. This constitutes for the patient a very strong positive reinforcement, thus helping him to continue with his program — a program that he was induced to, at least partially, accept on the basis of the results (again, direct and graphic) of an initial Snyder Test.

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* *Preventive Dentistry in Action*, Katz, S., McDonald, J.L. & Stookey, G.K., D.C.P. Publishing, pg. 78, 1972.

Laboratory Exercise – Snyder Testing

Name ______________________________ Date ______________

Interpretation

Positive: Change in color is recorded as ++ to ++++, according to comparison with the color-standard card.

Negative: No change in color or only slight deviation (0 or +).

	Hours of Incubation		
Potential Caries Activity	24	48	72
Marked	++ or over	+++ to ++++	++++
Moderate	Negative	++ or over	+++
Slight	Negative	Negative	++
Negative	Negative	Negative	Negative

Patient's Name ______________________________

Date ______________

Snyder Test Results

Sample 1:	* ______ 24 hrs.	* ______ 48 hrs.	* ______ 72 hrs.
Sample 2:	* ______ 24 hrs.	* ______ 48 hrs.	* ______ 72 hrs.

* Record as +, ++, +++, ++++

Comments on results ______________________________

____

____

____

____

____

What is the purpose of using two test tubes rather than one in performing a test like this?

What can you, as the evaluator of this test, state about the patient's diet as far as carbohydrate consumption is concerned?

On the Food Diary sheets for diet evaluation, many times patients will report what they *feel* they should be eating, not actually what they are eating. How can the Snyder Test aid you if you suspect that the patient consumes larger amounts of carbohydrates not reported on the food diary sheets?

Topic 23 Tes-Tape Oral Glucose-Clearance Test

Introduction:

This test indicates carbohydrate retention within a patient's mouth for a given period of time. Tes-Tape (Lilly) is used to demonstrate the oral clearance time of glucose derived from a candy bar. Upon contact with glucose, Tes-Tape undergoes a change from yellow to green. The tape can indicate the presence of glucose to less than 0.1 percent concentration. Although the existing evidence is not conclusive, many investigators have pointed out that glucose retention is directly related to dental-caries susceptibility.

Objectives:

1. Given all necessary equipment, perform a satisfactory oral glucose-clearance test on a patient and record the results on the worksheets provided.
2. Explain in writing the procedure for taking an oral glucose-clearance test as it relates to a complete preventive-dentistry program for the patient.

Equipment:

Lilly Tes-Tape
Candy bar
Toothpicks
Cotton-tipped applicators

Directions for performing an oral glucose clearance test

1. Cut ten ¼-inch sections of Tes-Tape and place in a row. Number in 3's from 0-24 at one end of each strip. Two "zero" strips are to be used. Do not touch the other end of the tape with your fingers.

2. The patient is instructed to rinse mouth with tapwater. Using a tooth pick or cotton applicator, remove some saliva from an interproximal area in the posterior portion of the mouth and moisten a testing strip marked "0". This tape should remain yellow, indicating the absence of glucose.

3. Instruct the patient to eat half a candy bar, which will be provided by the instructor, and ask her/him to rinse again. Immediately following, using another toothpick, transfer saliva from the same area to the second strip marked "0". The tape will turn green, indicating glucose is present. Thereafter, at 3-minute intervals, transfer saliva from the same area to fresh strips with new toothpicks until the tape remains yellow, indicating that the glucose has been cleared. Record **total** time as the clearance time.

4. Attempt to motivate the patient with a long clearance time (over 20 minutes) to improve her/his oral condition by:

   a. impressing the patient to brush thoroughly immediately after eating (especially carbohydrates); encouraging the patient to refrain from cariogenic foods and/or eating between meals.

   b. encouraging the patient to refrain from cariogenic foods and/or eating between meals.

Laboratory Exercise – Tes-Tape Oral Glucose-Clearance Testing

Name ______________________________ Date ____________

Patient's Name ________________________

Minutes	Color
0 (control)	____________
0 (glucose)	____________
3	____________
6	____________
9	____________
12	____________
15	____________
18	____________
21	____________
24	____________

______ minutes total clearance time

Conclusions: ____

____

____

____

From the conclusions of your oral glucose-clearance test, what might you emphasize and/or explain to your patient about her/his oral hygiene and food habits?

____

____

____

____

____

Topic 24 Temporary Acrylic Splint Fabrication

Objectives:

1. Given the necessary equipment, fabricate a three-unit temporary acrylic splint (within 3 attempts), which will properly fit and protect one pontic area and two abutment teeth.

2. Define pontic.

3. Define abutment.

4. In writing, describe and explain the purpose of a temporary acrylic splint.

Equipment:

- Alginate
- Preformed tray
- Typodont
- Bard-Parker blade
- Asbestos
- Vaseline lubricant
- Pumice
- Lathe
- Rubber mixing bowl
- Spatula
- Paper cups
- Acrylic (polymer/monomer)
- Prepared teeth

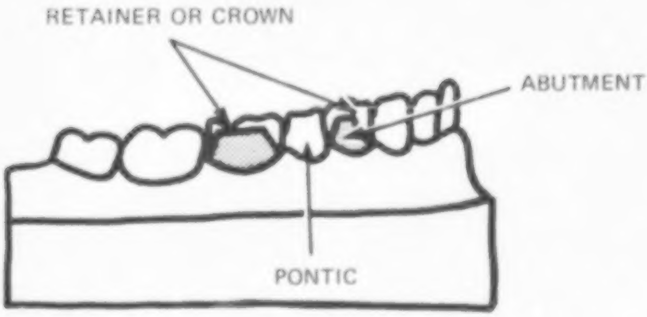
Thoroughly read all directions before beginning:

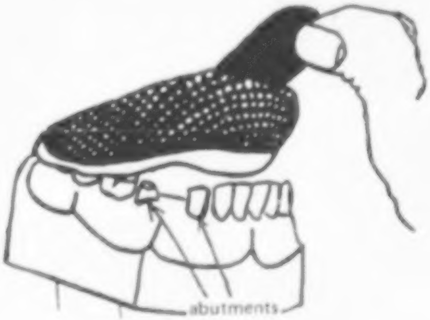
1. Obtain an alginate impression of an unprepared area either on a typodont or study model. (If a study model is used it should be wet before an impression is taken. Soak it in a bowl of water prior to taking the impression.)

2. When set, withdraw alginate from the typodont or study model.
   Note: Alginate will need a longer setting time than in the mouth, due to its not being at body temperature.

3. Allow for the pontic by cutting away that part of the alginate where the false tooth will be.

4. If on a typodont, before making the impression remove three teeth that will be used for the splint and replace both abutments with prepared teeth provided by your instructor. In the pontic area, fill radicular portion with asbestos or other filling material up to the cervical line.





5. Eliminate any undercuts in the impression by trimming away alginate from the interproximal areas of all uninvolved teeth.

6. To allow for better displacement of the acrylic, cut V shaped escapeways around the prepared areas.

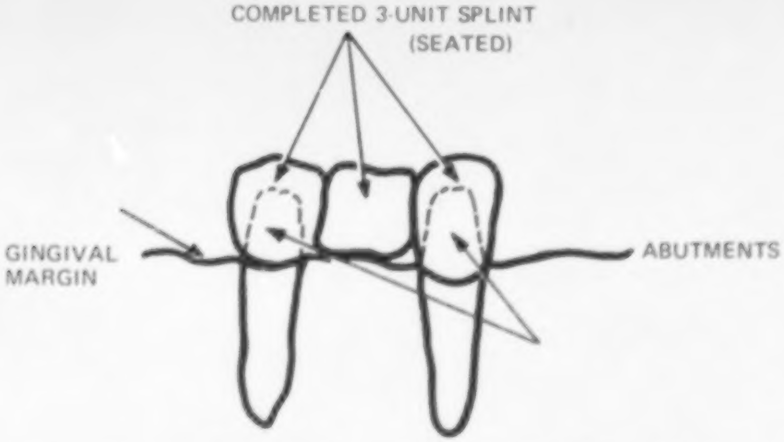
7. Trim off excess alginate toward the mucobuccal fold.

8. Mix the acrylic. Use a very thin initial mix and line the areas involved around the prepared teeth. Allow this to harden.
   Note: This is only one method of making the acrylic splint; other methods are just as easy to perform, and the results are the same.

9. Lubricate the typodont teeth and tissue portion with Vaseline to facilitate removal of the set splint.

10. Make another mix of acrylic, allowing the mixture to be the consistency of wet sand. Fill the remaining areas of the abutment teeth and pontic area of the impression to the cervical line.

11. Seat the filled impression onto the typodont and allow to set to the rubbery stage. As the impression is seated, the excess acrylic should escape via the V-shaped areas previously cut out.



12. Once set, remove the impression and temporary splint. If the splint fails to come off, it may need to be teased out with an explorer. Do not destroy the splint or it will not correctly reseat on the abutments. Allow the splint to harden thoroughly before the next step.

13. After final set, check for accuracy. All excess acrylic is trimmed off with either a stone wheel or bur; any minor adjustments may be made.

14. Finally, polish the completed unit with fine pumice.

15. Splint and abutments must be handed in for grading with the enclosed criteria and grade sheet. (You may hand in only one – the best of your three attempts.)

16. Be sure name and date are on the envelope, with the splint and abutments included.

Criteria Sheet for Temporary Acrylic Splint Fabrication

Name ______________________________ Date ______________

	Possible	Score
1. Undercut areas shown to be eliminated from impression	10	____
2. Acrylic correctly mixed to a good consistency	10	____
*3. Splint fits correctly over abutments with no forcing (10 for each tooth)	30	____
4. Excess acrylic trimmed away	10	____
5. Anatomical portion can be readily seen on splint	10	____
6. Splint polished	10	____
7. Name and date of student on envelope	5	____
*8. No voids on acrylic (-5 for each void)	15	____
TOTAL SCORE	100	____

Comments: ____

____

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*Crucial performance items

Introduction:

Baseplates and bite rims are an integral part of all accepted full-denture techniques. The baseplates form the pattern for the denture base material in the completed denture and also act as a support for the teeth in the preliminary wax-up and in the denture "try-in" in the patient's mouth. During these stages the base must be fully stable and free from large dimensional changes. With this method the dentist may determine the correct length of the artificial teeth and the proper bite relationship, as well as the proper articulation of the artificial teeth. Baseplates also help in determining the lip contour created by the dentures. The establishment of centric relationship is also facilitated by bite rims placed on these baseplates. The baseplate provides the patient with the opportunity to try in a waxed-up sample of the finished denture. It also provides for any changes which the dentist may feel are necessary before the denture is completely finished.

The material used in the construction of baseplates and bite rims may be baseplate wax, shellac plates, or cold-cure acrylic.

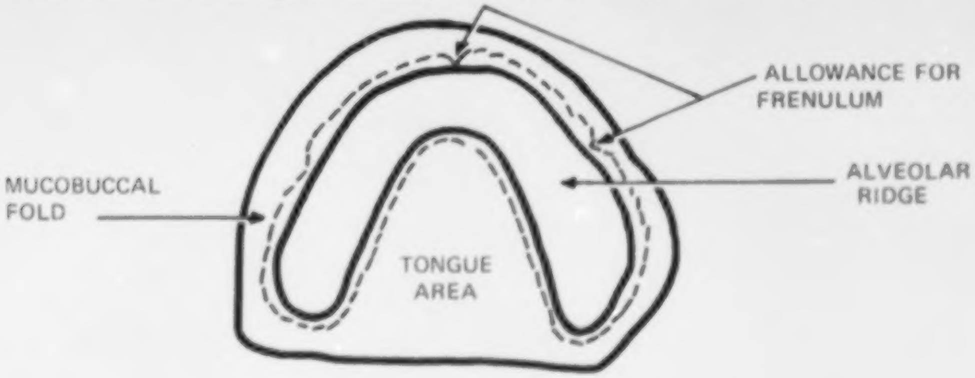
Objective:

Given edentulous stone study models (maxillary and mandibular) and the necessary armamentarium, the student will be able to construct acceptable maxillary and mandibular baseplates for those stone models.

Equipment:
Edentulous stone models (trimmed)
Indelible pencil
Baseplate material (shellac, wax, or acrylic)
Bunsen burner
Scissors
Wax spatula
Tapwater
Rubber mixing bowl

Read all directions prior to your beginning this laboratory exercise. A demonstration will be given initially by the instructor.

1. Prepare the edentulous models by outlining on the peripheral roll where the extension of the base plate should go, using indelible pencil markings as shown.



SUPERIOR VIEW OF MANDIBULAR BASE

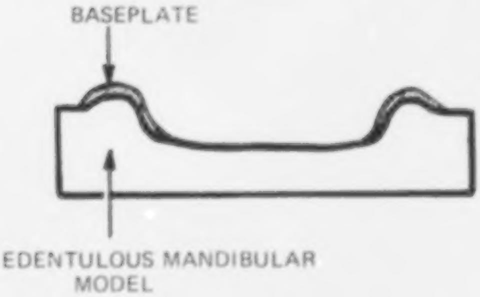
2. Soak the models in water for about 5 minutes.

3. Center the selected material on the appropriate model. Heat with the bunsen-burner flame, moving the flame constantly so that the material is evenly softened throughout and not burned in one spot. As the material becomes soft, it will slump over the model.

4. As soon as the material begins to slump, evenly and to your liking, carefully contour it to the model. For the maxillary, use your thumb to press the palatal portion in place, and use your other fingers to contour the periphery. It may be necessary to reheat portions of the material before the entire periphery can be contoured and covered.

5. Remove the semi-adapted baseplate from the model and trim off excess material. Slight heating will make the excess easier to remove without cracking and/or distorting the baseplate. Heating a wax spatula also will allow you to cut off the excess.

6. Replace the baseplate and perform any minor readapting to the plate area.



Posterior Transverse View

7. All the baseplates should be finished with smooth, rounded edges so as not to cut the patient's mouth during insertion. Remember to relieve the space for the frenulum (muscle attachments).

8. Also remember to cut around the lingual area on the mandibular model and adapt accordingly.

9. After the material is adapted to the model, place your name and date on the *inner* surface of the baseplates and hand in for evaluation and grade. (A criteria sheet is enclosed.) The criteria sheet, baseplates, and edentulous models should be handed in together.

10. Be careful in handling your baseplates, as they will be used for the construction of bite rims in a later laboratory session.

Criteria Sheet for Base-Plate Fabrication

Name ______________________ Date __________

	Possible	Score
1. Indelible pencil outlines on peripheral extension of borders		
maxillary	2	______
mandibular	2	______
2. Material heated correctly with no bubbling or burning		
maxillary	3	______
mandibular	3	______
* 3. Excess material cut back to allow for frenulum and muscle attachments (−5 for each area *not* cut back)	20	______
* 4. No rough edges found on inside area		
maxillary	15	______
mandibular	15	______
* 5. Baseplates adapt well to cast		
maxillary	15	______
mandibular	15	______
6. No fractures, chips, or cracks on plates	4	______
7. Name on inner surface of both plates	2	______
8. Date on both plates	2	______
9. Name on both study casts	2	______
TOTAL SCORE	100	______

* Crucial performance items

Comments: ________________________________

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Introduction:

Bite rims fabricated onto baseplates greatly help the prosthodontist establish proper relationships between the maxillary and mandibular edentulous areas. Bite rims also establish the bite relationship between two edentulous arches when the dentist arranges the artificial teeth onto the denture.

Objective:

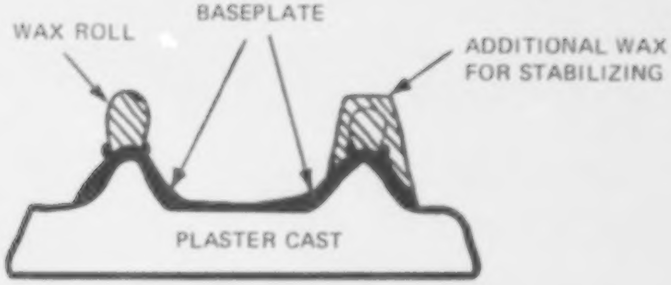
> Given edentulous stone study casts (maxillary and mandibular), construct acceptable bite rims (as outlined on the criterion sheet) onto your previously fabricated baseplate.

Equipment:

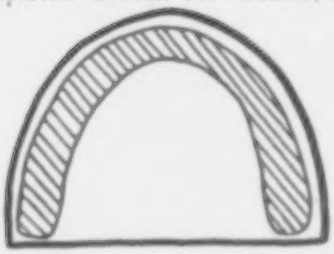
Edentulous maxillary and mandibular study casts
Previously fabricated baseplates
Baseplate wax
Wax spatula
Laboratory knife
Bunsen burner and matches
Millimeter rule
Wax heating plate

Read all directions prior to your beginning this laboratory exercise. A demonstration will be given by the instructor.

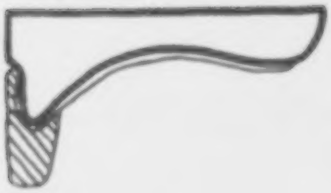
1. Have available the edentulous models with the baseplates on the models.
2. Soften one sheet of baseplate wax by passing it over the bunsen-burner flame. *Do not overheat;* this will cause mottling of the wax.
3. While the wax is still warm, form it into a roll about ½ inch in diameter. Roll lengthwise. If this is not thick enough to maintain the ½-inch diameter, reheat and apply a second roll of wax over the first.
4. While still warm, shape the wax into a horseshoe form to fit the occlusal rim of the baseplate exactly.
5. Lute the wax roll to the baseplate on the buccal and lingual surfaces with a heated wax spatula. Cut off the distal flash (ends) with a laboratory knife.



6. The wax rim should be stopped 12 mm short of the posterior extension of the baseplate. The distal ends should be cut off diagonally.
7. Smooth the occlusal surface of the wax, which is luted to the baseplate, by gently heating the wax-heating plate and then lightly pressing it onto the occlusal surface of the wax. Be sure that, when you are attempting to smooth this rim, it is parallel to the base of the model.
8. For an average cast, the mandibular wax rim should be about 8 mm high for the anterior section and about 4 mm high for the posterior area (before the diagonal cut.)
9. For an average cast, the maxillary rim should be about 10 mm high for the anterior section and about 4 mm for the posterior area (before the diagonal cut.)
10. Upon completion, be sure your name and date are on both models and both baseplates. Submit the models, bite rims, and criteria sheet for grade and evaluation.



Occlusal View



Sagittal View

Criteria for Fabrication of Bite Rims

Name ______________________________ Date ______________

	Possible	Score
1. Wax bite rim centered on occlusal rim of:		
mandibular model	2	____
maxillary model	2	____
2. Bite rims luted neatly to baseplate, with no excess of wax on baseplate	4	____
* 3. Bite rim 8 mm high for the anterior mandibular cast (-2 for every mm off)	10	____
* 4. Bite rim 4 mm high for the posterior mandibular cast (-2 for every mm off)	10	____
* 5. Bite rim stopped 12 mm short of posterior extension of the baseplate (-2 for every mm off)	10	____
* 6. Bite rim 10 mm high for the anterior maxillary cast (-2 for every mm off)	10	____
* 7. Bite rim 4 mm high for the posterior maxillary cast (-2 for every mm off)	10	____
* 8. Bite rim stopped 12 mm short of posterior extension of the baseplate (-2 for every mm off)	10	____
9. Bite rims cut diagonally across distal ends (3 for each correct cut)	12	____
10. Occlusal surfaces smooth	2	____
* 11. Occlusal surfaces of bite rims are parallel to the base of study casts.		
maxillary	7	____
mandibular	7	____
12. Name and date on study casts	2	____
13. Name and date on baseplates	2	____
TOTAL SCORE	100	____

*Crucial performance items

Comments: ____

____

Introduction:

Frequently, handpiece maintenance and lubrication takes a "back seat" in dental assisting duties. This sometimes results in shorter life of the equipment as well as unnecessary costs of repairs. Proper routine care of handpieces is indicated by each manufacturer; however, the dental assistant should be aware of when lubrication and maintenance are needed.

This session deals with only a few types of handpieces but will give the dental assistant a chance to dissassemble, lubricate, and reassemble the following pieces of equipment:

1. Emesco model #21 dental engine
2. Doriot handpiece #42
3. Densco friction-grip contra-angle handpiece
4. Midwest American Tru-Torc II straight handpiece
5. Starflite handpiece with sealed bearings
6. Starflite chuck

Objectives:

1. Given an illustration, identify dental handpieces as to type (e.g., contra-angle, straight, friction-grip).
2. Given a Doriot handpiece #42 and Model #21 dental bench engine, disassemble the handpiece and correctly lubricate as per manufacturer's instructions. After lubrication is completed, reassemble.
3. Correctly replace a belt on the Model #21 dental bench engine, per manufacturer's instructions, to working order.
4. Given an illustration of a compressed air and water, high-speed handpiece head, correctly label its parts.
5. Given a Densco friction-grip handpiece:
    a. Correctly disassemble, lubricate, and reassemble according to the manufacturer's instructions.
    b. Correctly remove and replace worn or damaged chucks.
    c. Correctly clean as per manufacturer's instructions.
6. In writing, state the difference between friction-grip and latch-type handpieces.
7. List three precautions which must be taken while operating a Midwest Tru-Torc II straight handpiece.

8. Given a diagram of a Midwest Tru-Torc II straight handpiece, correctly identify the following:
    a. barrel
    b. lock button
    c. tightening rod
    d. forward-reverse valve

9. Clean and lubricate a Midwest Tru-Torc II straight handpiece according to manufacturer's directions.

10. Given a list of handpieces, state the frequency of lubrication for each, as per manufacturer's directions

11. Given a Starflite handpiece, bur-changing tool, and friction-grip bur, insert or replace bur, as per manufacturer's directions.

12. Given a Starflite handpiece and bur-changing tool, successfully remove, clean, and replace chuck, as per manufacturer's directions.

13. Given a Starflite handpiece, cartridge-removal stand, and turbine cartridge, replace the cartridge and reassemble to working order, as per manufacturer's instructions.

Equipment:

Emesco Model # 21 dental bench engine (complete)
Doriot #42 handpiece (complete)
Densco friction-grip contra-angle handpiece (complete)
Midwest American Tru-Torc II straight handpiece (complete)
Starflite handpiece (complete)
Bur-changing tool
Turbine cartridge-removal stand
Any type friction-grip dental bur
Nylon cleaning brush
Cleanout pins
Pipe cleaners
Ultrasonic cleaner unit and solvents
Lubrication tubes and conditioners
Handpiece wrench
Handpiece cleaner
Soft, lint-free cloth
Alcohol

Maintenance of the Emesco Model 21 Dental Engine and Doriot Handpiece #42

General:

The Model 21 dental engine should be kept as free of dust and dirt as possible. Always keep oil off exposed surfaces, as the oil tends to collect dirt. All engine belts produce lint. The lint should be wiped off the engine periodically, and the belt should be changed when it becomes frayed.

Oiling Instructions:

1. Oil the motor after every 200 hours of operation. Two oil holes are provided for this purpose. Apply oil through oil holes until the cotton wick is saturated.

2. The allcord arm should be oiled after every 8 hours of use. Apply two or three drops of oil through oil holes. This lubricates the pulley bearings from the inside. Do not apply oil in any other way, as it will fly off the pulleys.

Replacement of belt:

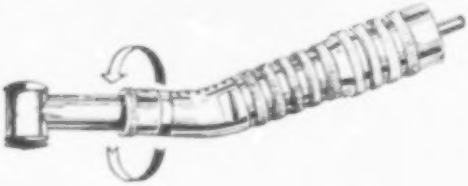
1. Thread the belt over the pulleys, starting at the motor pulley.

2. Adjust the belt tension by unscrewing the knurled nut on the allcord arm and sliding the smaller section of the arm up or down to increase or decrease the tension. The correct tension is achieved when the belt is tight enough so that it doesn't slip, but not so tight that it slows down the motor.

3. When the correct tension is obtained, tighten the knurled nut. This adjustment should be checked frequently, because all belts have a tendency to stretch with use. Cotton belts will skrink and expand with variations in temperature and humidity.

Maintenance of the Densco Friction-Grip Contra-Angle

Turn head locknut counterclockwise to unscrew. Always keep head locknut fastened tightly when angle is in operation. When replacing head, see that gears are properly meshed before tightening head locknut.

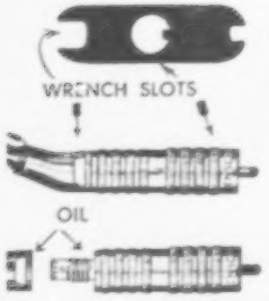


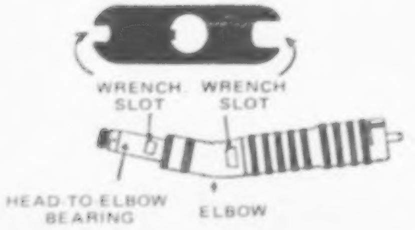
Lubrication:

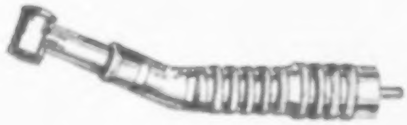
1. Under normal conditions of operation, this instrument should be lubricated at least twice a day and particularly cleaned and lubricated the last thing at night. Under certain conditions it may be necessary to lubricate even more frequently. Remove head. Hold head with the opening up. Place several drops of handpiece oil in the opening; replace head, making sure gears are meshed properly before tightening head locknut.

2. About twice a week the elbow gears should be lubricated by removing the rear-end assembly with wrenches. Insert oil inside the elbow and on the exposed gear. Screw rear end back into position firmly, making sure gears are properly meshed. Keep head-to-elbow bearing screwed tightly into elbow with wrenches at all times. There is no need to remove this head-to-elbow bearing at any time except for repair.

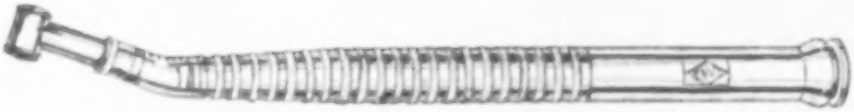
   Caution: Use light pressure on the wrench: too much pressure will strip the threads.



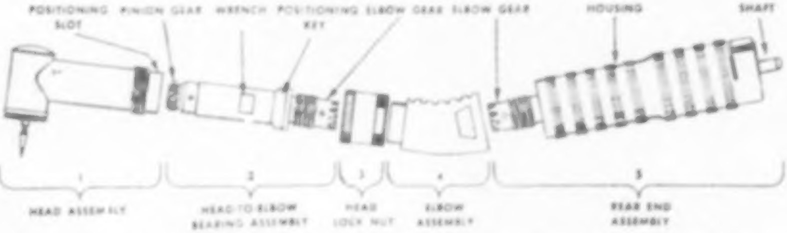




DENSCO Contra Angle UFG
Standard Head



DENSCO Contra Angle AFG
Standard Head


POSITIONING SLOT
PINION GEAR
WRENCH
POSITIONING KEY
ELBOW GEAR
ELBOW GEAR
HOUSING
SHAFT
1
HEAD ASSEMBLY
2
HEAD-TO-ELBOW BEARING ASSEMBLY
3
HEAD LOCK NUT
4
ELBOW ASSEMBLY
5
REAR END ASSEMBLY

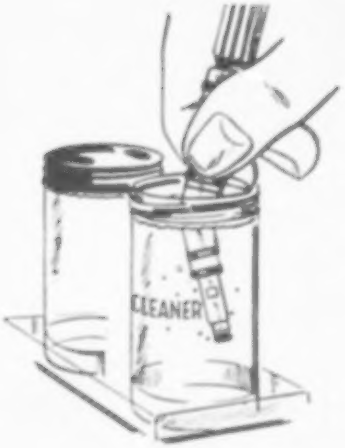
Above illustration shows the five major assemblies of the "Uni-Flex" construction.

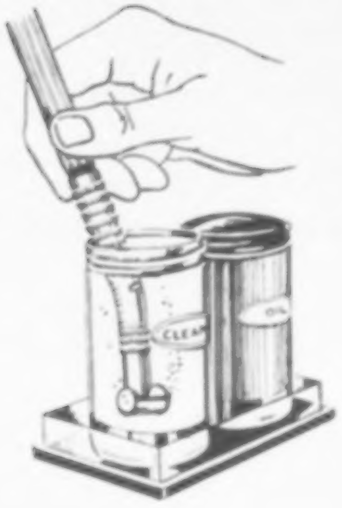
Cleaning:

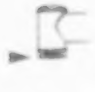
1. Cleaning and lubrication of these handpieces are two separate types of operations and cannot be combined into one.

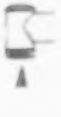
2. Remove plastic chuck and then head. Using a midget cleaning brush in the straight handpiece, dip the brush in the cleaner and run it into the head of the angle.

3. After cleaning, the head should be lubricated before assembling. Also, before assembling, run the head-to-elbow bearing in cleaner. Then run it in oil. Then blow it dry with air as indicated by the arrows shown.









Maintenance and Lubrication of the Midwest American Tru-Torc II Straight Handpiece

While speed depends on air pressure and the particular attachment being used, this handpiece is capable of delivering high torque at speeds from 200 to 5,000 RPM. It is designed to operate at a maximum air pressure of 30 psi. Pressure may be increased to 40 psi if additional speed is required; however, *do not exceed* 40 psi.

When this handpiece is connected to any make of dental unit or control cabinet having automatic oilers, part of the handpiece will receive oil, but the handpiece must also be lubricated manually twice a week.

Warning:

1. *Never depress lock button while spindle is rotating.*
2. *Never reverse rotation while spindle is rotating.*
3. *Make sure that the reversing valve is pushed all the way to the end of either side, or torque is lost.*
4. *Never tighten the tightening rod without a bur, mandril, or short-sleeve contra angle in the handpiece, as it will lead to pinching of chuck and vibration.*

Reversing Rotation:

A two-position valve in the lower shank of the handpiece enables the operator to quickly reverse the rotation of the handpiece. The valve should be pushed firmly inward until it locks in place. Be sure the valve is fully in position, otherwise a reduction in speed and torque will result. Push the valve only with your finger; use no mechanical devices.

Tightening the Bur:

Tighten the bur by pressing down on the lock button and holding it in a depressed position while tightening the chuck-tightening rod.

Sterilization:

Never sterilize the complete handpiece with hot oil, water or air. The sheath may be removed for hot-water sterilization, after which it should be blown out with air.

Autoclaving:

Remove the handpiece from the hose. Remove the sheath from the handpiece. Place the handpiece and the sheath in the autoclave at 250°F for 15 minutes. After the handpiece has cooled, place three drops of conditioner in the second largest "C" inlet tube. Attach the handpiece to the hose and place one drop of conditioner at end of "A" and "B" of the spindle support. Run the handpiece for 3-4 seconds before using.

CLEANING AND LUBRICATION. If your TRU-TORC II is operated on a non-lubricated air line, the following instructions must be performed every day that your TRU-TORC II is used. If your TRU-TORC II is automatically lubricated, follow these instructions at least twice weekly.

CLEANING:

1 Remove sheath and immerse spindle to point "A" in one ounce Conditioner bottle. Run handpiece at very slow speed to thoroughly clean front bearing.

2 Dip pipe cleaner in Conditioner and swab out chuck by passing into front of spindle.

3 Clean outside of spindle and sheath support with brush and wipe clean [point "B"].

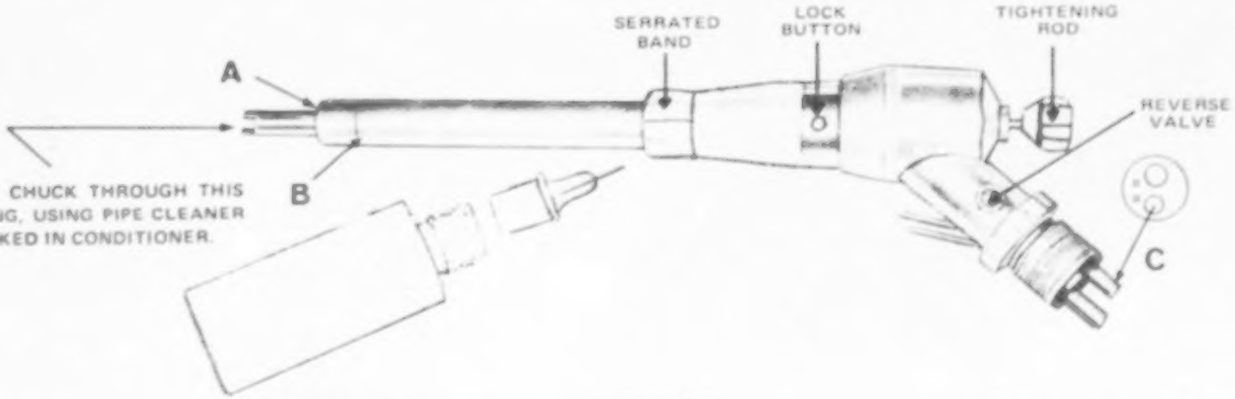
4 Clean the inside of the sheath with a brush dipped in Conditioner.

LUBRICATION:

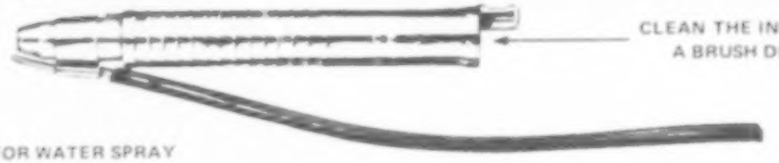
1 Place one drop of Conditioner in sheath lock ring.

2 Place one drop of Conditioner on the rear tightening rod bearing.

3 Place three drops of Conditioner in the smaller of the two large connector tubes [point "C"].

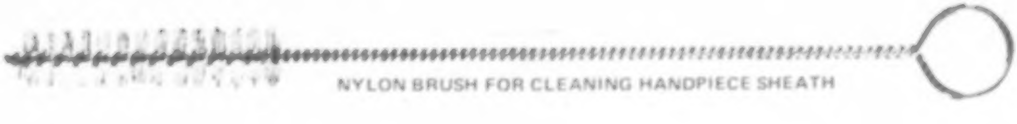


CLEAN CHUCK THROUGH THIS OPENING, USING PIPE CLEANER SOAKED IN CONDITIONER.



CLEAN THE INSIDE OF THE SHEATH WITH A BRUSH DIPPED IN CONDITIONER.

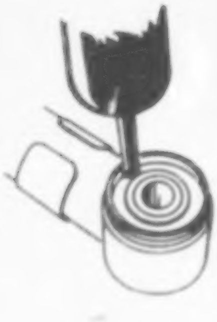
CLEAN-OUT PIN FOR WATER SPRAY

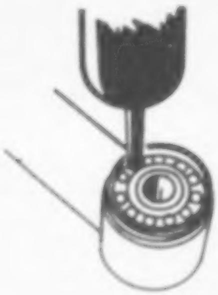


NYLON BRUSH FOR CLEANING HANDPIECE SHEATH

Maintenance and Lubrication for the Starflite Handpiece Cartridges

1. Lubrication should be done once weekly.
2. Remove both end caps by unscrewing with your fingers.
3. Wipe all debris and dust from these end caps with a cotton applicator.
4. Place needle of lubricating tube (syringe) gently against and perpendicular to the lubricating hole. Do not force the needle into the hole.

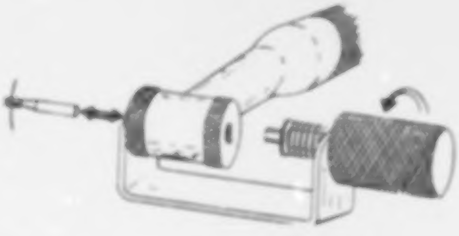




5. Inject a small amount of grease into each bearing. Do not press hard. Overlubrication will cause sluggishness. If this occurs, place one or two drops of engine oil on bearing shields.
6. Run turbine for 5-10 seconds or until it runs smoothly.
7. Repeat steps 5 and 6.
8. Wipe off excess lubricant. Replace caps.

Changing Burs or Diamonds:

1. Attach bur-changing tool to handpiece as shown.



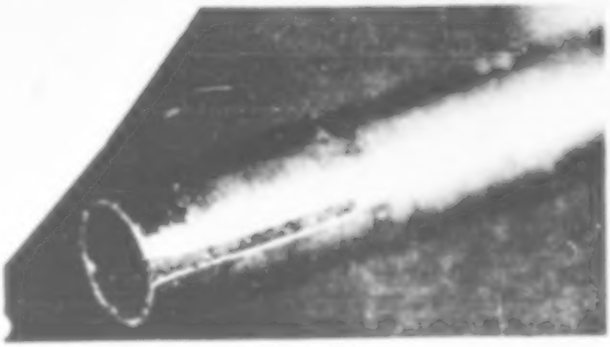
2. Release handle so that wrench engages with chuck.
3. Turn handle counterclockwise one-quarter or one-half turn to open chuck.
4. Remove old bur or diamond.
5. Insert and hold new bur or diamond in place while tightening.
6. Turn handle clockwise until tight.

Caution: *Do not overtighten, as this will result in damage to chuck or bur-changing tool.*

Note: To change chuck, follow the above steps and in step 3 continue to turn handle until chuck is removed.

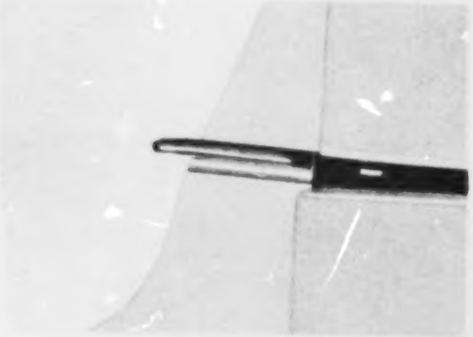
Maintenance of Chucks:

1. Remove chuck with cartridge. Do not remove the end caps.
2. The illustration below shows the debris buildup on chuck and slits. This debris may cause the dentist or you to tighten the chuck too much. It may also prevent the chuck from locking the dental bur in place or even allow it to fall out through the end cap. At high speed this could cause a major accident.



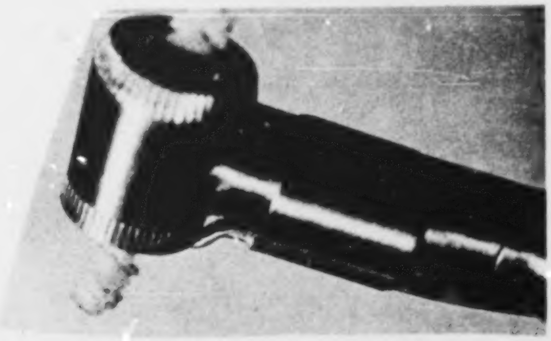
3. If an ultrasonic cleaner unit is available, place the chuck into the solvent solution for about 5 minutes.

4. To manually remove the debris, use a clean piece of thin paper and slide it through slits with an outward motion, so that debris is drawn out and away from the chuck. Inspect the chuck to see that all debris has been removed.



5. Before replacing the chuck, saturate a pipe cleaner with cleaner solution and draw through the center hole of cartridge. This will clear the cartridge area of all debris. Replace chuck, inserting it through top cap, turning with fingers in clockwise direction.

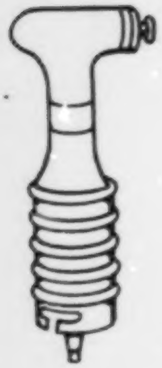
6. Tighten with chuck key.



Laboratory Worksheet – Handpiece Maintenance

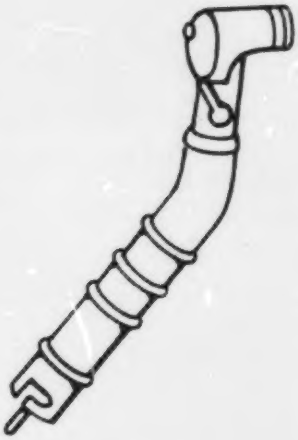
Name ________________________________ Date ______________

Identify the following handpieces as to name and use:



________________ (name)

________________ (use)



________________ (name)

________________ (use)

Introduction:

Although there are many varieties and types of spot welders, if the dental assistant becomes familiar with the function and components of one, it will be a simple matter to learn the operation of any other that may be encountered on a job. The Rocky Mountain 660 unit introduced in this laboratory session solders, welds, and anneals. It is designed for use in the procedures performed in an orthodontic and pedodontic office.

Objectives:

1. Given a diagram of the Rocky Mountain 660 spot-welder unit, correctly identify its main components.
2. Given a Rocky Mountain 660 spot welder and various stainless orthodontic materials, correctly spot-weld attachments to orthodontic bands as per the manufacturer's instructions.
3. Using the Rocky Mountain 660 spot-welder unit, correctly solder a space-retainer bar to a molar band, using the techniques outlined by the manufacturer.
4. Correctly anneal (heat-soften) a piece of stainless steel arch wire, using the Rocky Mountain 660 spot-welder unit.
5. In writing, describe the maintenance procedures which must be periodically followed on the Rocky Mountain 660 spot welder to keep it in good operating condition.
6. Given the Rocky Mountain 660 spot welder and other necessary equipment, perform routine maintenance care on the unit.

Equipment:

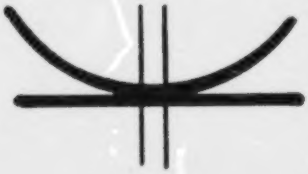
Rocky Mountain 660 spot-welder unit
Lingual buttons
Orthodontic molar bands (preformed) or other banding material
Buccal tubes
.016 (or similiar size) auxiliary spring wire
Contouring pliers
Ligature cutting pliers
Mandrel with wire brush for polishing
Flux
Emery file

Spot Welding

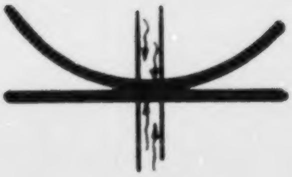
Spot welding is accomplished by passing an electrical charge of high amperage and very low voltage (safe to handle, no shock hazard) through the materials to be joined. The charge passes between two conductors, called electrodes, placed on either side of the spot to be welded. The material itself must be resistant to the electrical current. This causes that portion placed between the electrodes to heat up and fuse (melt together). It is actually a combination of the heat and pressure from the turrets that causes the two metals to fuse.

Stainless steel is a good material for spot welding; however, too high a nickel content in the stainless steel can cause non-resistance to the electrical current, and the material will not weld satisfactorily. Materials such as aluminum, copper, and precious metal alloys cannot be welded due to their high electrical conductivity.

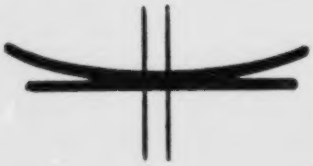
Welding



Electrodes holding two pieces of metal

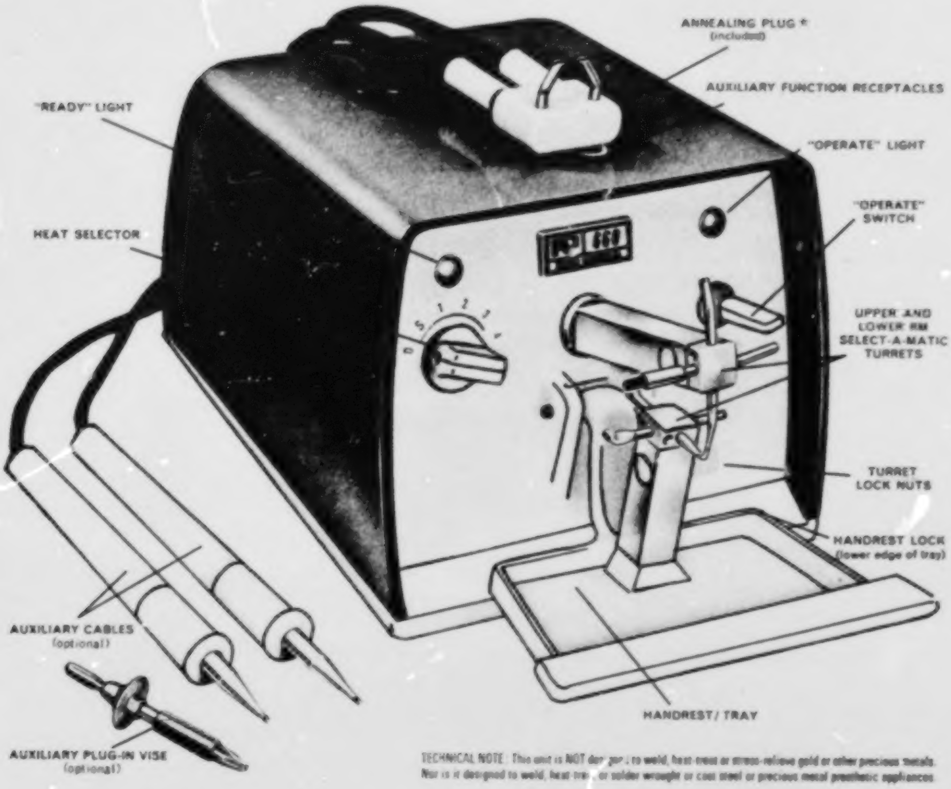


Operating switch is activated; a charge is built up.



Two metals fuse to become one

Components of the Rocky Mountain 660 Spot Welder:


ANNEALING PLUG *
(included)
AUXILIARY FUNCTION RECEPTACLES
"READY" LIGHT
"OPERATE" LIGHT
"OPERATE" SWITCH
HEAT SELECTOR
0 .5 1 2 3 4
UPPER AND LOWER RM SELECT-A-MATIC TURRETS
TURRET LOCK NUTS
HANDREST LOCK
(lower edge of tray)
AUXILIARY CABLES
(optional)
HANDREST/ TRAY
AUXILIARY PLUG-IN VISE
(optional)

TECHNICAL NOTE: This unit is NOT designed to weld, heat-treat or stress-relieve gold or other precious metals. Nor is it designed to weld, heat treat, or solder wrought or cast steel or precious metal prosthetic appliances.

Select-a-matic turrets:

Both upper and lower turrets can be rotated to the position and type desired by using light finger pressure. These turrets will snap into place easily and automatically aline themselves to the correct position. Each electrode is securely held into position by the turret.

Locknut:

In a tightened position, this nut maintains the position of the electrodes. To remove the turret, simply unloosen this locknut.

Heat selector:

This switch turns the unit on and off and selects various temperature ranges for the procedure to be done. A chart accompanies the machine, stating the heat selection for each type of procedure and material. Higher numbers indicate higher heats.

Position "S" is for soldering.
Positions 1 through 4 can all be used for welding.
Position 4 is a welding heat only.

Ready light:

After the heat selector has been activated, the ready light will indicate when the unit is ready to function.

Annealing plug:

Seated in the auxiliary receptacle on the top of the unit, this plug may be left in place and any auxiliary cables plugged into it.

Operate light:

Lights up when the unit is activated and current is running through the machine.

Operate switch:

This toggle switch is operated by pressing downward. The electric current is activated when this switch is depressed, and it is automatically time-controlled for welding. This lever is also used for soldering with the turret carbon electrode.

Handrest/tray:

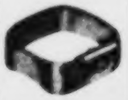
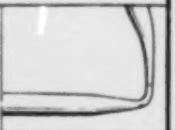
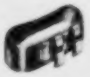
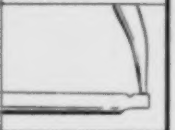
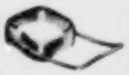
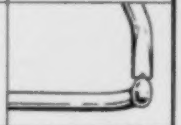
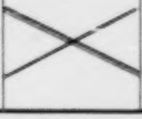
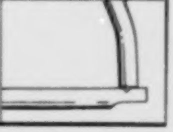
Depressing the entire tray opens the turrets and activates the auxiliary function switch. This tray area also can hold small appliance parts to avoid misplacing them while using the unit.

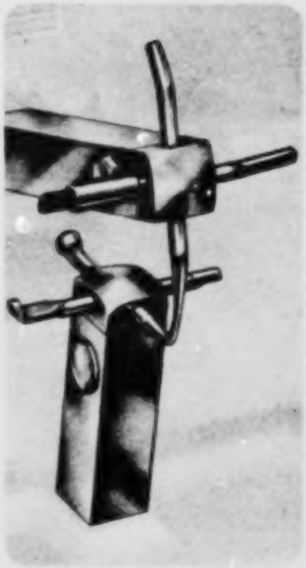
Handrest lock:

Lock is activated by pushing button when tray is in down position. When the tray is depressed in lock position, the internal auxiliary switch is activated also. To release the lock position, simply depress the tray further and the lock will automatically release.

Welding Heat Chart

Materials	Selector Number
Matrix material Small arch wires	1
.003, .004 wire Joining-band material	2
Lingual buttons Light to medium attachments to bands .005, .006 wire	3
Buccal and lingual tube attachments to molar bands	4
For soldering only	S

RECOMMENDED ELECTRODE COMBINATIONS:			
Attachments to bands, joining plier-formed bands and matrices.		pointed pointed	
Attachments to bands too small to go over the pointed electrodes, like small size anterior and cuspid bands.		pointed anvil	
Wires to bands or crowns, space maintainers, fixed linguals, etc.		grooved ball	
Wires to wires..."finger" springs to arch wires, wire cribs, occlusal rests, etc.		blunt anvil	



Directions for spot welding buccal tubes to molar bands

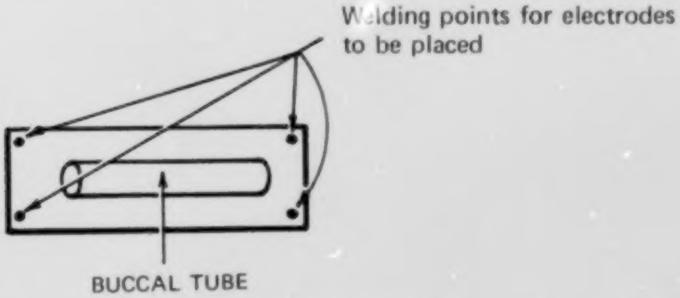
1. Select the appropriate electrodes by depressing the handrest/tray and rotating the electrodes to the correct position by using light finger pressure.

   Note: Always use upper and lower pointed electrode combinations whenever possible. These electrodes confine the heat and pressure for maximum strength of weld. Other combinations are intended for specialized applications where use of the pointed electrodes would be difficult, such as on wires.

2. Select proper welding heat on the heat selector. (Use chart on page 281.)

3. Obtain a preformed molar band and buccal tube attachment.

4. Position the buccal-tube plate correctly on the molar band. Depress the handrest/tray bar with the heels of your hands. This will open the turrets. Use the thumb and forefingers to hold the buccal tube and band in position between the electrodes. Allow the handrest/tray bar to rise and firmly hold the band and tube in place. Four welding points should be sited on the buccal tube plate (as shown).



5. Once properly aligned, depress the "operate" switch. "Operate" light will also flash to show that current has been activated.

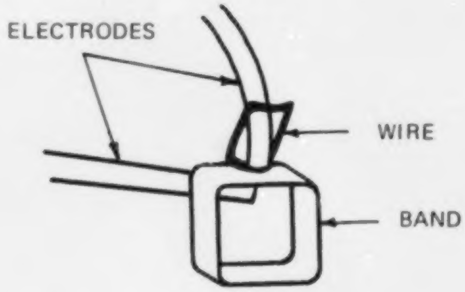
6. Readjust position after each welding point has been completed.

> **Note:** Some sparking may occur at times "... due to the minute irregularity of the surfaces being welded together. The electric current jumps across these irregularities, resulting in visible sparks, which are harmless."

Materials can be held in place manually without danger of any electrical shock.

Directions for soldering a space retainer (maintainer)

1. Position the molar band and wire bar between the turrets and proceed to weld the materials together as described in the previous section.



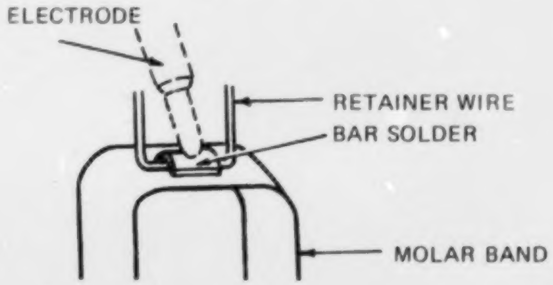
2. Rotate the upper turret to the carbon tip and the lower turret to the soldering electrode.

3. Be sure the carbon tip (upper turret) is free from dried flux. File the soldering electrode (lower turret) with a carbon file. This will remove any debris and also brighten the tip.

4. Place the heat selector on "S". Before soldering, always test the operation of the carbon tip by depressing the "operate" switch without any material between the electrodes until the carbon starts to glow. If it does not glow, the electrodes are not clean and must be recleaned with the carbon file.

5. Using bar solder, contour a piece into a V shape so that the solder will cradle the area to be soldered.

6. Cut the piece of solder with cutting pliers. The solder piece must be as large as the end of the carbon tip to keep the flux from making contact with the tip. The bar solder will be seated over the retainer wire.



7. Apply flux to the area to be soldered.

8. Replace the previously cut solder bar on the molar band. Insert the bar, wire, and band into the turret area. The carbon tip must rest on top of the solder bar. Be sure the electrodes are not contaminated with flux, as this would prevent the flow of the current through the area.

9. Activate soldering by depressing "operate" switch. The carbon tip will heat and glow, thereby melting the solder. Continue to heat until the solder covers the entire area to be joined.

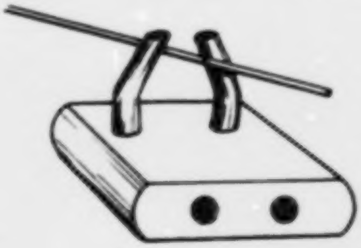
10. Once the solder has hardened, remove and quench in water.

11. Remove any residual dried flux with a wire brush.

Directions for annealing a piece of wire

Annealing is softening by heating to a high temperature (2000°F)

1. Place the annealing plug into position on the top of the spot-welder unit. The plug inserts into the black and white receptacles.
2. Place the heat selector on "S".
3. Place the stainless steel wire between the copper elements of the annealing plug.



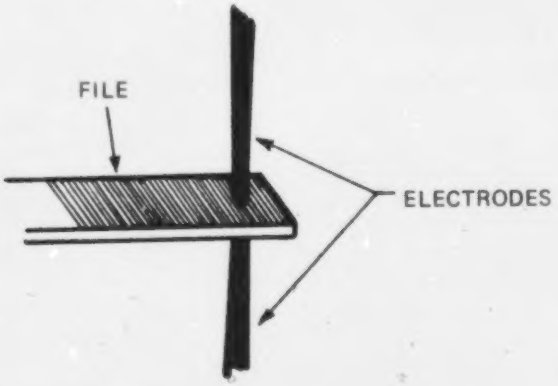
4. Depress the handrest/tray bar to activate the internal auxiliary current. After the wire becomes bright red, release the handrest/tray bar, or else remove the wire from the copper elements. It should be annealed soft.

Note: If the wire does not become bright red with the "S" setting, readjust to either #1 or #2 setting on the heat selector.

Maintenance of the Rocky Mountain 660 Spot Welder Unit

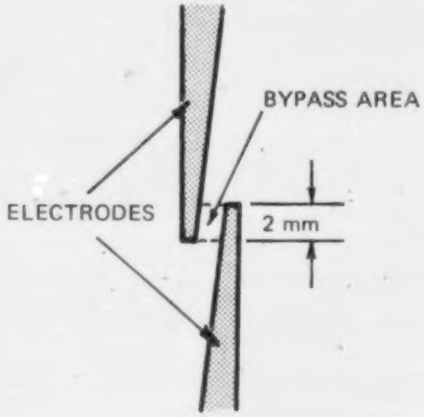
1. Depress the handrest/tray bar and insert the file between the electrodes. Move the file back and forth in a horizontal direction. Also remove any burs from the sides of the electrodes.

2. File all pointed tipped electrodes with a fine steel file to about 1 mm diameter and level the surfaces so they meet evenly.



3. Eventually the electrodes wear down and must be replaced.

4. Electrode pressure should maintain a minimum of 2 mm when the upper electrode is allowed to bypass the lower one (as shown below).



5. When not in use, the spot welder should be covered, and accessories properly stored.

6. Cleaning of the spot welder can be done with a soft cloth dampened with water and mild detergent. No abrasives should ever be used.

Introduction:

Zinc phosphate cement is composed of zinc oxide powder and phosphoric acid. Proper consistency of this cement is an essential part of the mixing. The dental assistant must be aware that zinc phosphate cements are mixed to different consistencies according to their purpose (i.e., luting, as a temporary restoration, or as a thermal insulator between pulpal tissue and metallic restorations).

For luting, the zinc phosphate cement must be mixed to a creamy consistency. It should flow off the mixing spatula. A much heavier, thicker consistency is necessary for use as a temporary restoration or insulator.

The manufacturer must meet A.D.A. specifications for this dental material. If a poor consistency results, you can assume it is due to improper mixing techniques.

Objectives:

1. Given the necessary armamentarium, properly mix zinc phosphate cement as per manufacturer's directions for:
   a. luting
   b. use as a temporary restoration
   c. use as an insulator against thermal and/or chemical injury to the pulp
2. List the equipment necessary to properly mix zinc phosphate cement.
3. State two factors that are critical in obtaining consistent results when preparing the mixing slab for zinc phosphate cementation.
4. State the chemical composition of zinc phosphate cement.

Equipment:
Zinc phosphate powder and liquid and dispenser
Cement spatula
Glass mixing slab
Timer

Directions for mixing zinc phosphate cement

Note: Directions for mixing zinc phosphate cement may differ slightly according to the manufacturer. Be sure to read literature contained within the package before beginning to mix.

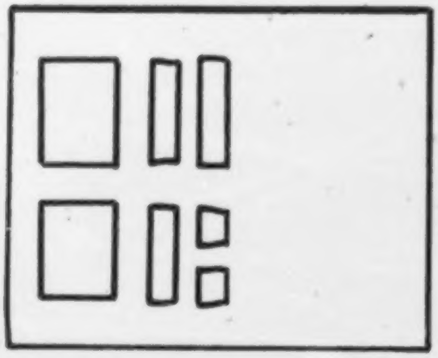
1. Slab must be free from scratches and/or set zinc phosphate cement. Cool the glass mixing slab to 65°-70°F by running it under cool tapwater. (Some glass mixing slabs can be purchased with thermometers imbedded into the glass.) If not cooled, the mix of zinc phosphate will set too fast. A cooled mixing slab slows down the chemical reaction of the powder and the liquid, thereby prolonging the setting time of the mix.

2. Dry the mixing slab thoroughly with a towel.

3. Measure out the appropriate amount of powderonto the glass slab. (Again, amounts will depend upon the manufacturer's specifications.)

   Note: Be sure the powder and the liquid do not come into contact with one another until you are ready to mix.

4. Place the powder to one end of the glass slab divided into approximate portions as follows: two 1/16 portions, three 1/ portions and two 1/4 portions.



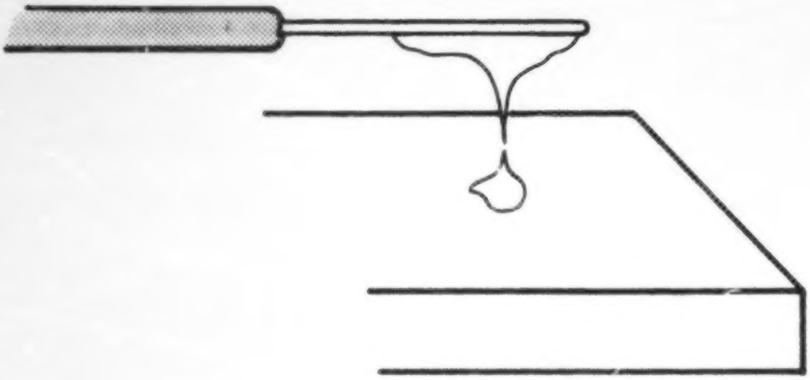
5. Dispense the correct amount of liquid onto the glass slab. *Timing and temperature control are critical in mixing zinc phosphate cement.*

6. Total mixing time should be 1½ to 2 minutes.

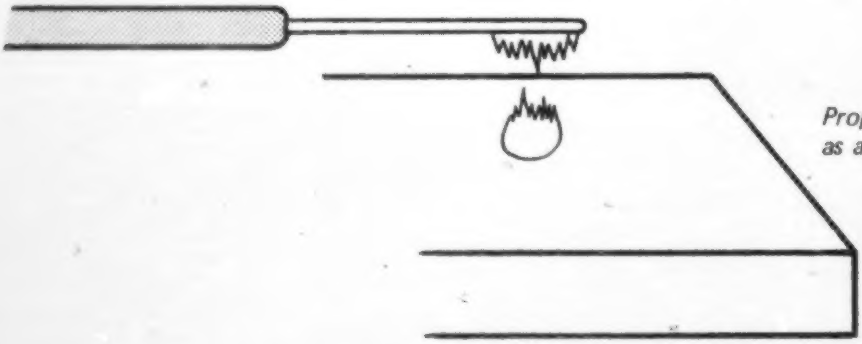
7. In mixing, use half or more of the surface of the glass mixing slab. Hold the spatula flat against the slab surface, spreading the mix widely over the mixing area. Use a rotary motion with firm pressure on the spatula.

8. Start with one of the 1/16 portions. Continue to add each portion of powder separately, mixing it into the slurry. Approximately 15 seconds' time is allowed for each divided portion of the powder to be incorporated into the liquid. Continue until the proper consistency has been reached. Not all powder portions need be used.

9. For an insulator or temporary restoration, mix the cement to a thick, puttylike consistency instead of the thin, flowing mixture used for luting.



Proper condition for luting



Proper condition for use as a base or insulator

10. After practicing the proper mixing technique to a proficiency level, prepare another zinc phosphate mix; however, *do not dry* the glass slab. Note the results on the enclosed laboratory worksheet. Take special note of the time and consistency.

11. Complete a luting mix with a *warmed* glass slab and note the results on the exercise worksheet also.

12. Complete a mix by adding the powder to the liquid all at once instead of in small increments. Note these results also.

Laboratory Exercise – Mixing Zinc Phosphate Cement

Name ______________________________ Date ______________

1. State the chemical equation for the mixing of zinc phosphate cement:

____

2. In the above chemical equation, besides zinc phosphate, what else is released?

____

3. The main ingredient in zinc phosphate cement powder is ____________________

What differences (if any) did you find when mixing zinc phosphate cement:

4. on a wet glass slab? ____

____

5. on a warmed glass slab? ____

____

6. When you incorporate all the powder into the liquid at one time instead of using the increments every 15 seconds, what happens to the mix?

____

____

____

Circle the correct response:

7. The more liquid incorporated into the powder of zinc phosphate cement, the (slower, faster) the setting time.
8. The lower the temperature during the mixing of the zinc phosphate cement, the (shorter, longer) the setting time.

Introduction:

Silicate cement is composed of finely ground particles (powder) of silica, alumina, lime, fluorides, and oxides. The liquid portion of silicate cement is similar to zinc phosphate-cement liquid in that the principal ingredient is phosphoric acid; however, these two liquids cannot be interchanged due to different buffering agents and water content. Silicate cement is used for luting and anterior restorations.

Objectives:

1. Collect all necessary equipment and properly mix silicate cement as per manufacturer's directions for:

    a. luting
    b. an anterior restoration for a tooth

2. List the equipment necessary to properly mix silicate cement.

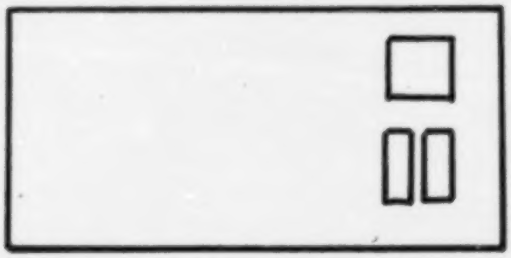
3. State the composition of silicate cement.

Equipment:

Silicate powder and liquid and dispenser
Silicate (Agate) spatula
Glass mixing slab
Timer

Directions for mixing silicate cement

1. Cool the glass mixing slab to about 65°-70°F by running the mixing slab under cool tapwater.
2. Dry the slab thoroughly.
3. *Do not contaminate the glass glab with your fingers after drying.* Measure out correct amounts of powder and liquid as per manufacturer's directions.
4. Place the powder to one end of the glass slab divided into these portions, approximately: one 1/2 portion and two 1/4 portions.



5. Dispense the correct amount of liquid onto the glass slab.

   Note: The mixing of silicate cement on a glass slab differs from mixing zinc phosphate cement in that a small area of the slab is utilized rather than a large area.

6. Total mixing time should be 60 seconds.
7. Initially, incorporate the half portion into the liquid and mix over a *small* surface area. Complete the mixing of this portion in 30 seconds.
8. Draw remaining portions into mix at 15-second intervals.
9. If necessary add small increments of extra powder to bring about the proper consistency desired.

Introduction:

Continual practice in mixing rubber-base impression material will help the dental-assisting student when she/he begins work in a dental office. Manipulation of this material can be very difficult; it can also be very costly (in the sense of chair time and labor) if errors occur in mixing technique.

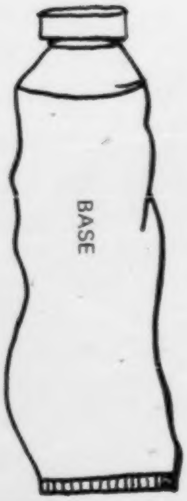
Objectives:

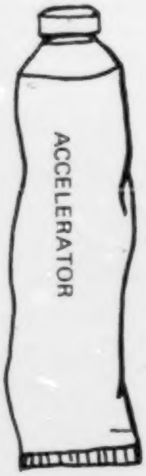
1. Given the necessary armamentarium, mix rubber-base impression material (heavy-bodied and light-bodied). as per the manufacturer's directions, to the proper amount and consistency.

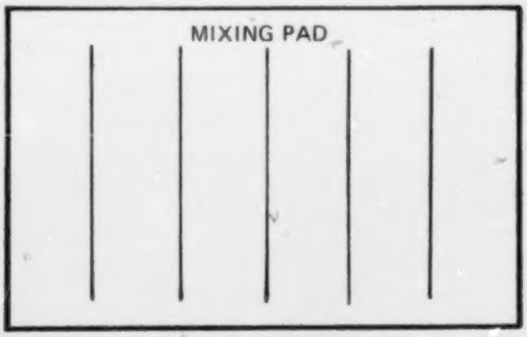
2. List the necessary equipment to properly mix rubber-base impression material.

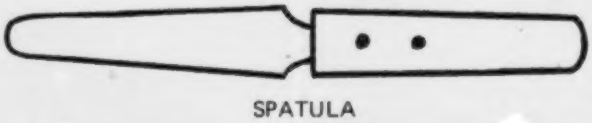
Equipment:

Light-bodied rubber-base impression material
Heavy-bodied rubber-base impression material
Paper mixing pad
Spatula
Paper towels







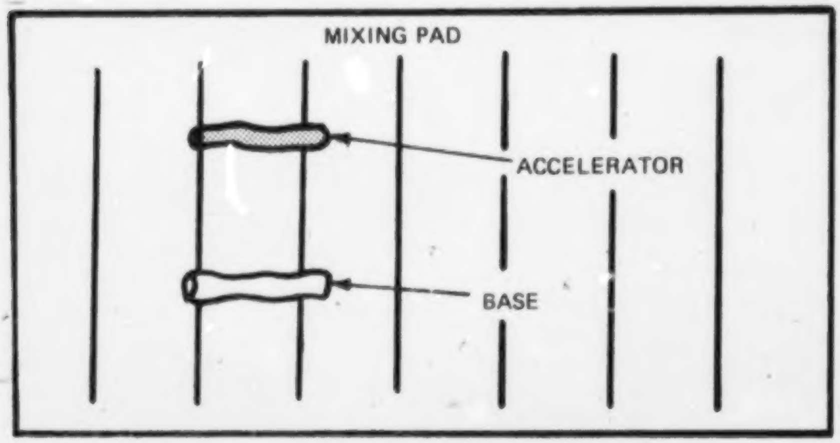


Directions for mixing rubber base impression material:

1. Assemble all equipment.
2. Using either the light-bodied or the heavy-bodied rubber-base impression material, express approximately 1 inch from each tube (catalyst and base) onto paper mixing pad.

   Note: Do not allow catalyst and base to touch each other until you are ready to mix.

   a. The paper pads are usually scored with lines one inch apart.



   b. Care must be taken to avoid clothing damage by rubber-base impression material. (Once this has contacted clothing, it can be removed only with great difficulty).

3. Mix rubber-base impression material for 45-60 seconds. Use the side of the spatula and mix in a circular motion until the material is completely blended together (no dark streaks of accelerator within the white base).

   a. Occasionally wipe the side of the spatula to allow for a better blending.

4. Both heavy-bodied and light bodied rubber-base material are handled in the same way.
5. Cleaning the spatula afterwards can be facilitated by running it under hot tapwater. This will cause the impression material to set, and then it can be easily peeled off the spatula.
6. Counter tops soiled by the impression material can be wiped clean with alcohol.

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